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1/21

cosmetic dentistry

beauty & science

interview

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Dr Sushil Koirala

Editor-in-Chief

Welcome to the first 2021 issue of *cosmetic dentistry*

Last month, we celebrated World Oral Health Day on 20 March, the theme for 2021–2023 being "Be Proud of Your Mouth". Customarily, we have acknowledged and highlighted the message to brush twice daily, floss at least once a day and visit the dentist regularly. We have tried to make healthy mouth habits a cornerstone of the reduction of oral disease burden in society. However to be sure that the objective of celebrating World Oral Health Day is met, we have to raise the general consciousness level of people regarding their oral health. Healthy mouth habits have to be understood by an individual in relation to his or her compassion for his or her health and himself or herself in that the outcome of being aware is much impactful than the outcome of merely being informed. Thus any piece of information sent out cannot have a meaningful impact if it does not have an approach that enhances the self-compassion of the recipient. It is only when an individual is compassionate to himself or herself that he or she can improve his or her quality of life and lead a truly happy life. It is interesting to note that daily toothbrushing has not yet been promoted as an activity of self-compassion and happiness in order to achieve optimal oral health and promote quality of life. We have always focused on the mechanical (removal of dental plaque) aspect of toothbrushing and not on its potential to have a meaningful and positive impact on the person's mind and happiness as well.

The COVID-19 pandemic and its global impact have further ingrained in me, as a clinician who has practised for almost 30 years, the essence of the Vedic Smile philosophy—the body seeks health and the mind happiness, and the only path to satisfying both is by being in harmony with nature—that I have been practising since early in my dental education. The three-month lockdown period due to COVID-19 in Nepal gave me an opportunity to understand the power of a simple toothbrushing activity and how it can be incorporated as a meditative technique to instil awareness and compassion by making it a good practice in the daily lives of children and adults. We all can imagine the negative impact of COVID-19 on the emotional health of children, adults and especially senior citizens globally, and it has been proved by multiple scientific studies that emotional health and happiness can be enhanced by simple healthy habits. I firmly believe that toothbrushing can be an excellent act for the enhancement of mental health along with augmentation of oral hygiene.

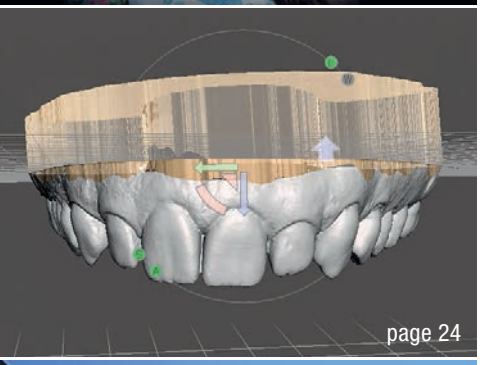
Thus, with this notion in mind, I have designed a simple and effective protocol which will be known as the meditative toothbrushing technique (MTB). I believe that this protocol will help practitioners both to keep mouths clean and to promote happy minds. I have decided to work for the *future* and the future is the *children*. The Punyaarjan Foundation (www.punyaarjanfoundation.org.np) has decided to run an MTB school programme as a charity project to promote awareness and self-compassion among children so that good oral hygiene becomes a habit.

Through this editorial, I would like to appeal to all our readers who also believe that children are the future, to join hands to help our children be healthy and happy.

Sincerely,

Dr Sushil Koirala
Editor-in-Chief


page 06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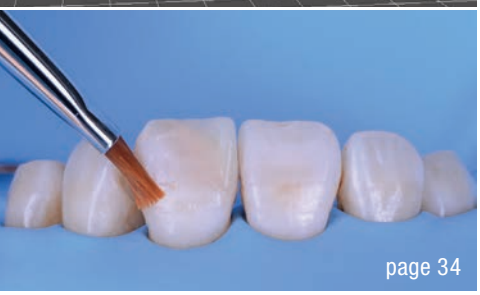
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Celebrities' Smile Makeup—the MiCD way

Dr Sushil Koirala, Nepal

Fig. 1: Smile Design Wheel, showing four key components of smile design.

Introduction

In today's beauty-adoring society, most people have the desire to look and feel their best, since facial and physical appearance have a crucial role to play in an individual's self-esteem, happiness and eventual success. It is undeniably human nature to attribute positive personality characteristics to attractive individuals, and such people customarily receive favourable treatment in a variety of situations.[1] Beauty is subjective and difficult to delineate, as it lies in the eyes of the beholder, and the same applies to a beautiful smile. A substantial amount of research has suggested that smiles are powerful social forces that positively influence interpersonal judgements in innumerable ways. In global business, beautiful smiles are widely used as a marketing tool to produce positive impressions among fans and other consumers.

Service with a smile is an established mantra in customer relationship management,[2] and smiling faces are omnipresent in advertisements.[3] It is therefore certain that contemporary celebrities in different fields desire attractive smiles that suit their personalities and professions. In the modern world, social media has become the overarching tool for self-promotion and marketing, and it is now a platform whereby fans follow celebrities, causing them to be increasingly self-conscious of their smiles and beauty. This vicious cycle of celebrities' desire and need for beauty and their glamour business have fuelled the growth of the smile beautification business in dentistry. This article mainly focuses on smile enhancement of social media celebrities using the Smile Makeup protocol developed by the author, based on his established minimally invasive cosmetic dentistry (MiCD) concept and treatment protocol.[4]

Who is a celebrity?

This question seems simple, but the definition of "celebrity" may confuse many, as there are varieties of celebrities in the society, and the last century has witnessed a dramatic shift in the definition of "celebrity" in terms of cultural and social acceptance. Celebrity status is accorded to someone who is known for being well known,[5] and the dictionary definition of a "celebrity" is "a person who is famous";[6] in summary then, a person who is recognised by the masses for his or her popularity is considered a celebrity. From a psychosociological perspective, celebrities are usually presented as role models, and it is a normal part of life development for people to model themselves on their favourite celebrities as part of the process of identity exploration.[7,8] Basically, celebrities have three important societal aspects in common. First, they are well known for being well known within their realm; second, they appear to hold some influence over the public consciousness; and third, they come from all walks of life, so they may be successful business leaders, athletes, actresses, politicians, scientists, authors and musicians, among others.

Celebrity categories

In the past, celebrities used to receive coverage through traditional media such as the press, film and TV and had little direct connection to or communication with their fans and followers. However, with the advent of Internet-based media, people now can bypass the entertainment, press and TV industries and launch themselves as celebrities through the use of social media, including YouTube, Facebook and Instagram. Free social media

platforms have made available the opportunity to become a celebrity even to ordinary people, and the trends of "celebritification" have become more pivotal to our culture than ever before. The author classifies his cosmetic dentistry-seeking celebrity patients into two categories in order to manage their treatment in a stress-free, comfortable and confidential manner.

Traditional media celebrities

These are celebrities in core and constant areas such as entertainment, sports, politics, religion and business who have worked strenuously to gain recognition, whose journey to fame has been characterised by persistence, and who are widely popular among people in their own country and/or internationally. These celebrities are frequently highlighted through traditional media such as press, film and TV. Even though these celebrities have their own social media networks, they generally do not interact on a personal level with their fans, followers or audiences and prefer to separate their professional and personal lives. When accepting celebrities in this category for cosmetic dentistry treatment, the clinician must consider that these people are very busy and demand extra attention, such as exclusive scheduling, super comfort, supreme confidentiality and faster treatment modalities. Generally speaking, the day-to-day business of cosmetic dentistry of the clinic cannot fully rely on this category of celebrity, since there are limited numbers of such celebrities in any given society.

Social media celebrities

These are a new kind of celebrity in the contemporary global market. They are groomed or self-created and have become popular using social media networks. Unlike traditional media celebrities, these celebrities focus on developing direct connections with their fans and are active in engaging in an interactive dialogue on social media, fostering the illusion of a personal connection. They believe in self-marketing and promotion, creating personal brands, and invest considerable time in managing their profiles, ensuring that their photographs, comments and videos are in line with their overall brand image, either personally or through their supporting team. Owing to their constant social media activity, these celebrities are now evolving into a wonderful market for cosmetic dentists around the world. Although there is no precise means of categorising social media celebrities in the market, to understand the possible social influences of cosmetic dentistry-seeking celebrities, the author classifies social media celebrities into four levels based on their social media followers and fans (Table 1).

Celebrities' domains

In order to become known in a society, a person needs to possess some extra value in his or her domain. From an MiCD practice management point of view, the qualities of traditional media and social media celebrities are divided into four main domains to help MiCD clinicians understand the perceptions, ego and emotions of the celebrity being treated.

Fig. 2: Smile Makeup brand logo.

Attractiveness: In this domain, look, acting, voice and style are considered core virtues, and celebrities from entertainment industries like film, modelling, music, acting, fashion, beauty pageantry and TV fall under this domain. The celebrities in the attractiveness domain develop and manage their fan bases through deliberate self-presentation using a variety of traditional media like press, TV and social media; hence, they are very sensitive regarding their facial and smile appearance and always covet the best beauty and style to enhance their popularity.

Expertise: Knowledge, skill, experience and qualifications are considered the core strengths of this domain; thus, famous people in sport, science and technology, business, management, finance, fine arts and literature fall under this domain. Depending on their public contact and followers, the celebrities in this domain may also be sensitive regarding their facial and smile appearance but not to the same extent as celebrities in the attractiveness domain.

Trustworthiness: In this domain, genuineness, reliability, trustworthiness, honesty and other similar ethics and inner qualities are deemed key strengths. The celebrities in this domain earn their fame and popularity from ethical business, humanitarian work and deeds; hence, facial beauty and smile aesthetics may not be among their highest priorities.

Contrived: This is actually a pseudo celebrity group that does not possess any common trait; however, they are popular or visible in the traditional media or may have

Social media celebrity levels based on their number of followers

Mega SM celebrity: more than a million followers
Macro SM celebrity: between 100,000 and a million followers
Mini SM celebrity: between 25,000 and 100,000 followers
Micro SM celebrity: between 5,000 and 25,000 followers

Table 1

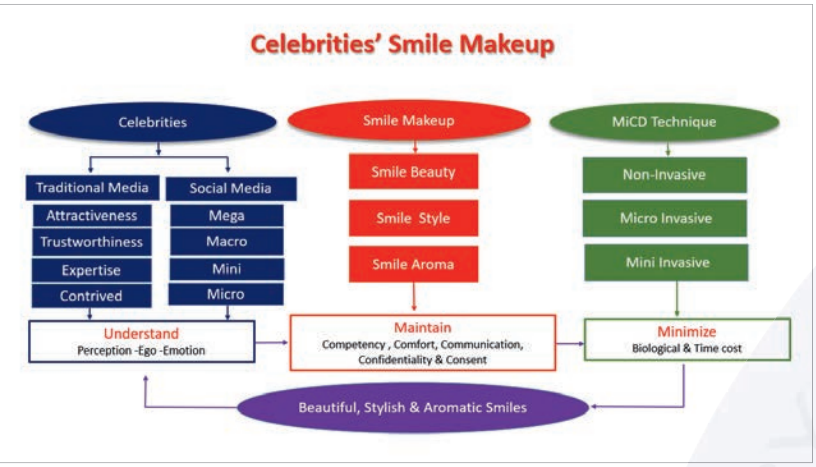

Fig. 3: Celebrities' Smile Makeup.

a huge number of followers in social media just because they have close association with other celebrities and involvement in their activities. These self-proclaimed celebrities generally have high egos and demonstrate fake emotions. Hence, practising cosmetic dentists should take extra precaution in communication and dealing with celebrities of this domain.

Treating celebrities: MiCD five Cs requirements

Naturally, a person's success, high popularity, fame and ability to influence public consciousness brings about positive or negative changes to that person's perceptions, personality and desires. Depending upon the domain of the celebrity and the level of his or her popularity and public influence, the type and sensitivity of changes vary. In this article, the author focuses on celebrities in the attractiveness domain, and his 25 years' of experience in treating multiple categories of celebrities and high-profile patients has revealed that those in the attractiveness domain are very stressed, are unaware of the value of natural tooth structures and their beauty, and generally have a biased perception of facial and smile aesthetic trends, desiring physical beauty, even if unrealistic. However, in terms of emotional expression, the author has found that the majority of these celebrities are emotionally weak and fragile in nature and are actually confused as to what they want. Hence, the author suggests that a clinician must meticulously understand the psychological components (perception, personality and desire) of the Smile Design Wheel (Fig. 1)[9] for these celebrities in depth and handle them with care and compassion. Treating celebrities does not necessarily mean beautifying their smiles alone, but also enhancing their emotions positively and bringing some happiness into their lives through dentistry.

It is quite natural for a cosmetic dentist to be excited when a celebrity visits his or her practice seeking cosmetic treatment. However, sometimes treating celebrities may become stressful and frustrating and may even fail if the five Cs requirements of MiCD are not met during treatment.

Competency: The first and foremost component is competency. Evaluating your own and your team's clinical competency level in handling cosmetic dentistry cases of high-profile celebrities is very important before you accept their case for treatment in your practice. If you think you and your team do not have the requisite competencies, then it is your ethical, professional and commercial responsibility to invite suitable experts into your practice or to refer the celebrity to a practice that has the capability so that the celebrity can receive the best possible treatment. Another key area is treatment planning, because any overtreatment or over-ambitious treatment planning proposal may backfire on your reputation and business in the long run. Always keep in mind the possible biological, technical and skill limitations that may force you to modify the treatment planning at the execution level.

Comfort: Comfort and celebrities go hand in hand, and celebrities generally desire an exclusive appointment schedule, the most comfortable physical environment, careful handling of their egos and emotions, painless treatment procedures, a reduced number of clinical visits and timely completion of treatment. Hence, if you think you cannot fulfil these universal celebrity desires at your practice, then it is wise to explain these issues clearly to the celebrity or his or her representative in advance.

Communication: Communication in cosmetic dentistry plays a vital role in treatment success and patient satisfaction. In this regard, the author suggests using the Smile Design Wheel and considering the psychological (perception, personality, desire), health (general, specific, dentogingival), functional (occlusion, phonetic comfort) and aesthetic (macro, mini, micro) factors during communication and smile design. Always ensure that your patient understands the possible aesthetic outcomes, invasiveness (biological cost), required time and financial cost of the treatment procedures. Clarifying his or her smile aesthetic outcome after treatment for the patient in advance is crucial and helpful for better communication. There are a number of methods that you can use to communicate this once you have done your treatment planning, such as Quick Smile Design (direct aesthetic mock-up), digital aesthetic mock-up using suitable dental software, laboratory-fabricated indirect smile trial and a combination of the aforementioned procedures.

Confidentiality: This is the basic right of any dental patient. However, in the case of celebrities, the clinician needs to be especially cautious, since many of them do not want it known that they have visited a dental clinic and undergone cosmetic dentistry treatment to enhance

their smiles. Hence, one should be very careful and obtain the necessary permission before capturing photographs of celebrities in the clinic areas and before posting to your social media channels. It is the author's personal view that placing too much emphasis on celebrities' visits to the practice may disturb other patients' egos and emotions and may negatively impact on the ethical principle of equal treatment in clinical dentistry. Hence, as described in the comfort component, it is better to manage the celebrity's appointment separately (either as the first patient or as the last patient of the day) rather than scheduling him or her between appointments with the general public. If you really want to exploit the publicity mileage of treating celebrities at your practice, then the better and more professional way is to obtain written testimonials about your overall services from these celebrities and from other clients and to share these together so that everyone feels acknowledged and respected.

Consent: In the MiCD clinical protocol, obtaining written informed consent is mandatory for maintaining professionalism and for legal purposes. The content of the consent may vary according to the local dental council or the relevant health authority. It is the practitioner's responsibility to maintain the protocol of consent.

Once you know your celebrity patient's category and domain and once you have considered the fice Cs, then you need to categorise the case, that is, what type of cosmetic dentistry treatment your patient actually needs or wants. According to the MiCD clinical protocol, cosmetic cases are divided into four simple categories:[10]

Rejuvenate: A simple procedure—and the most effective aesthetic procedure in MiCD—that enhances smile aesthetics with slight modifications of alignment, brightness and contour of the anterior teeth—this is also known as the MiCD ABC principle.

Restore: A process of replacing missing dental tissue to enhance health, function and aesthetics.

Rehabilitate: A process of complete reconstruction of the smile in order to harmonise aesthetics and functionality for long-term health and happiness—it falls under the MiCD complex category, as it generally demands a multidisciplinary approach.

Repair: A process of maintaining and improving previously performed aesthetic restorative and other work.

Smile Makeup the MiCD way

Since the introduction of the MiCD concept and its treatment protocol in 2009, MiCD do no harm cosmetic dentistry has become globally popular and its value and benefits accepted. The clinical experiences of the author and MiCD Global Academy members at multiple clinical centres has revealed increasing awareness among cosmetic dentistry-seeking patients of the long-term benefits of minimally invasive dental procedures in saving the natural tooth structure. It is interesting to note that contemporary dental patients are curious and concerned about the biological cost (invasiveness) of treatment before starting the procedure.

The emergence of such positive changes in consumer awareness regarding the invasiveness of cosmetic dentistry prompted the author to exclusively publicise the rejuvenate category of MiCD cases among clinicians, the general public and celebrities around the world. Hence, in 2017, based on his MiCD concept and treatment protocol, the author officially introduced the Smile Makeup (Fig. 2) of cosmetic dentistry for celebrities (Fig. 3) and the general public.[11] The author believes that Smile Makeup should be an inseparable part of the day-to-day personal make-up of any individual. Clinicians must understand that looking good, feeling good and smelling good is an innate human desire in modern society, and the global market of such business is skyrocketing. Therefore, introducing the Smile Makeup package in clinical practice can enable clinicians to deliver smile enhancement treatment with simplicity, with efficiency and at low biological and financial cost.

Smile Makeup is an innovative, advanced dental procedure designed exclusively to enhance and harmonise the smile and facial attractiveness of a person at minimal biological, financial and time cost.[11] It is composed of three basic components of attraction and glamour, namely the beauty, style and aroma (smell) of a smile. During the Smile Makeup process, the smile's beauty, style and aroma are analysed using the Smile Makeup Index (Fig. 4), which helps to objectively quantify the status of the existing

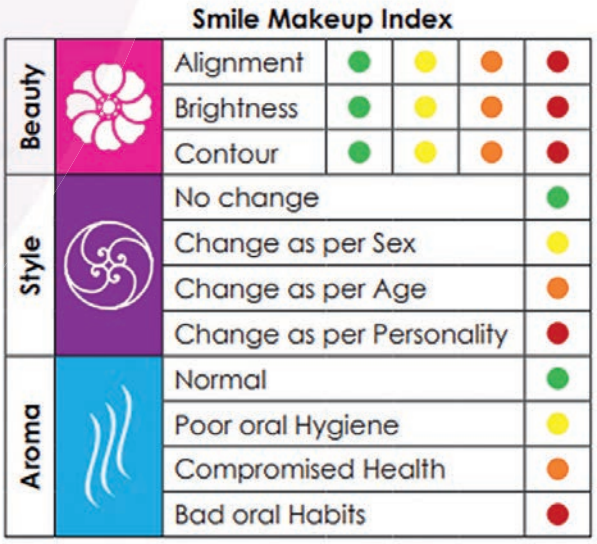

Fig. 4: Smile Makeup Index.

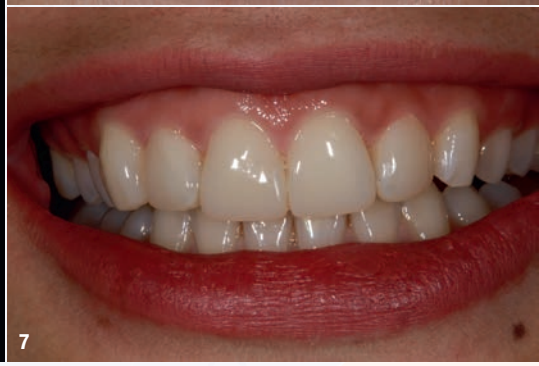

Fig. 5: Ms Niti Shah, Miss Nepal International 2017. **Fig. 6:** Initial situation. **Fig. 7:** Final outcome.

smile and its treatment complexity, making communication with patients easy and fruitful.

The Smile Makeup package has the following key benefits:[11]

- is patient-centric and respects the patient's right to choose the smile he or she desires;
- focuses on naturo-mimetic smile design principles and emphasises individual customisation of smile aesthetics rather than creating symmetrical stock smiles;
- modifies the beauty, style and aroma of a compromised smile and creates synergistic effects to enhance and harmonise facial attractiveness and the smile;
- is painless and has little to no biological cost;
- is a fast, predictable, healthy and affordable procedure compared with conventional cosmetic dentistry approaches;
- does not change the existing occlusion, so is very comfortable for the patient;
- reduces the likelihood of overtreatment and safeguards the patient's trust;
- complements facial make-up in a true sense.

Smile Makeup experiences

Ms Niti Shah, Miss Nepal International 2017 (Figs. 5–7):
"I never knew having good teeth makes such a difference in a person's facial beauty and confidence. I had two small gaps in between my front teeth and the shape of some front teeth were not in harmony with my smile. After winning the Miss Nepal International title at the Miss Nepal competition in 2017, I was introduced to the Smile Makeup International Clinic of Vedic Smile Pvt. Ltd, where a team of Smile Makeup experts did my smile analysis and Quick Smile Design (QSD). After completion of the QSD, I was asked about any modification I wanted. Once I had approved the design, the team at the Smile Makeup clinic completed my Smile Makeup procedure without any drilling and touching my natural teeth; hence, I did not have to go through any pain and discomfort. I am so glad to see the result of my Smile Makeup, which has drastically enhanced the beauty and style level of my smile. Now I love my smile so much and have gained the confidence to smile at any context. When I look back at my old close-up pictures, I feel I should have done my Smile Makeup before I participated in Miss Nepal. I am very happy to be one of the clients of the Smile Makeup International Clinic of Vedic Smile Pvt. Ltd."

Ms Sahara Basnet, Miss Nepal Asia Pacific International 2017 and Miss Intellectual 2017 (Figs. 8–10):
"On 2 June 2017, I was crowned Miss Nepal Asia Pacific International 2017 and had begun the race to my international to compete along with girls from 50 other countries. However, even after being a certified beauty queen, I never truly felt flawless. Glancing at the pictures post-pageant, I realised that, though I looked good, having a visible crooked smile in a way made me look unpolished. That is when Smile Makeup was introduced into my life through Vedic Smile. By using the transparent Smile Makeup braces for only two months, my teeth were completely transformed. With the help of Smile Makeup braces, my teeth were perfectly aligned and they were

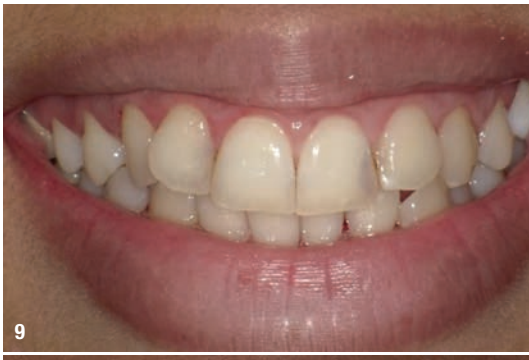

Fig. 8: Ms Sahara Basnet, Miss Nepal Asia Pacific International 2017 and Miss Intellectual 2017. **Fig. 9:** Initial situation. **Fig. 10:** Final outcome.

also restored and reshaped into perfect sizes, making them look absolutely flawless. This alteration drastically enhanced my smile aesthetics as a model and especially as a pageant queen. My Smile Makeup improved my looks and made me instantly recognisable for my flawless smile. This not only boosted my confidence on a day-to-day basis but also allowed me to have a foot forwards when it came to my stage presence on the international platform. This was not only the case in the pageantry world, but also when it came to the corporate world. Having a flawless smile amplified my confidence, gave me a presentable front and aided my endeavours towards becoming a public speaker. Even in my personal life, Smile Makeup enhanced my smile and made me look more radiant and sociable. Even though I used to feel like my crooked and discoloured teeth never held me back, having the Smile Makeup done has now completely changed my outlook in life. When it comes to the glamour world, now I am recognised as the girl with the best smile by my social media followers and I haven't looked back ever since. Smile Makeup not only changed the way I view myself, but it has drastically changed the way other people view me as well. The importance of Smile Makeup aesthetically is immeasurable, but it also had a profound impact on my personality and the way I carry myself every day. In a way, Smile Makeup gave me a new identity."

Conclusion

The Smile Makeup package exclusively focuses on enhancing the beauty, style and aroma (health) of a smile with minimal biological and time costs, which is alluring for both the public and celebrities. The free platform of social media has given every ordinary individual the opportunity to become a celebrity, and the trend of celebritification has become more central to our culture than ever before. Moreover, the desire of the general public to become noticeable in social media groups has increased dramatically within the last few years and has opened up a huge market for smile beautification and its related business. Hence, the author suggests to all clinicians who desire to treat celebrities and high-profile patients in their practice for aesthetic reasons, to first offer the Smile Makeup package because the majority of smile problems are actually related to minor alignment, brightness and contour imperfections of the anterior teeth and gingivae, all of which can easily be beautified using this simple and minimally invasive approach.

Editorial note: This article originally appeared in MiCD Clinical Journal*, Issue January-June 2021, and an edited version is provided here with permission from the author. A list of references is available from the publisher.*

contact

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"To me, dentistry is a consolidation of science, art and medicine all in one field"

An interview with Dr Rhonda Kalasho

By Iveta Ramonaite, Dental Tribune International

According to Dr Rhonda Kalasho, cosmetic dentistry should be left to professionals who are skilled in periodontal maintenance and the art of symmetry and ceramics.

Dr Rhonda Kalasho has recently been acclaimed as the most detail-oriented dentist in Hollywood. She works at one of the most innovative dental practices in the US, where she offers cosmetic, paediatric, emergency and general dental care and treats dental conditions such as bruxism and sleep apnea. In this interview, Kalasho talks about some of the state-of-the-art tools she uses in her practice and discusses the dangers of do-it-yourself (DIY) dentistry and the influence of social media on smile restoration. She also reveals how COVID-19 has affected her day-to-day work and presents some of the challenges facing cosmetic and restorative dentistry.

Dr Kalasho, could you tell us a bit about yourself, and how you became a dentist?

I was very young when I came to the US from Baghdad, Iraq. We did not have a lot of money when we arrived, and food and survival were more important than oral hygiene. I found myself in the dental chair a lot when I was young, and I experienced what it was like to have extreme dental pain at a young age. I always wanted to be in the medical field helping people, but I think dentistry spoke to something more than my yearning to bring health and wellness to the public. To me, dentistry is a consolidation of science, art and medicine all in one field.

I love working on patients, and I enjoy every aspect of dentistry—from root canals to veneers. I do it all, and I love it all. Dentistry has come so far, particularly in the last decade with the advancement of 3D printing

and scanning technologies, so I always stay up to date with the newest modalities and research and take part in continuing education above and beyond what is required. It is a blessing to be in this field, and I am grateful to be a part of it every day.

GLO Modern Dentistry is considered to be one of the most innovative dental practices in the US. What are some of the state-of-the-art tools and techniques that you use in your dental practice?
Our office is fully equipped with the latest and the greatest, including CBCT, intra-oral scanners and 3D microscopes. I am not one to buy tools that have no purpose and just look fancy. All the equipment we have in the office is not only state-of-the-art, but also ensures higher-quality dentistry.

Our scanners are incredibly precise, and our implant restorations and implant-retained full-mouth cases are all fully mapped and designed using 3D programs. Patients have full autonomy and are given a vision of what they will look like and what they can expect. Some of the most difficult patients for dentists are those who need molar endodontic therapy or retreatment, and with our 3D microscope by Seiler Medical, the treatment of these difficult molars becomes seamless. I have yet to miss a canal using the microscope, and the coolest thing is that I get to perform root canals wearing 3D glasses, which is beyond fascinating. Patients are always taken aback by the technology we have at the office, and I am constantly searching for the best so that I can bring them the highest-quality dental care.

What is the primary reason patients come to see you—to fix minor imperfections, such as tooth overcrowding or unevenness, or for more advanced dental treatments?
I like to think of myself as an old-school dentist using cutting-edge technologies. I perform dentistry on a broad spectrum—including fillings, implants and advanced cases of Invisalign treatment. After the completion of my residency at the U.S. Department of Veterans Affairs' San Diego VA Medical Center, I continued to advance my skill set in multiple specialties to provide my patients with the most comprehensive dentistry at the highest level of care. If I am restoring a Class II cavity or extracting impacted third molars, I immerse myself completely in the procedure, and I love every second of what I do.

It is the quality of the extracurricular studies undertaken and a willingness to learn that will allow even a general dentist to perform high-quality specialty care. At times, I refer some cases to my colleagues in the various dental specialties. However, for the most part, I treat almost any dental condition or issue that my patients come and see me for.

You are known as one of the most stylish and detail-oriented aesthetic dentists in Hollywood. Could you elaborate on that and explain how it affects your role as a dentist?
Being in the heart of Hollywood, many patients who see me are on the big screen. They are singers, songwriters, producers and artists, so it was truly a surprise and incredibly humbling to be acclaimed as the most detail-oriented dentist in Hollywood. My staff and I have a motto by which we operate—we treat every patient like we would our own families. If you go into every case thinking this, your mood becomes warmer, your hands become lighter and you end up putting a lot of love into your work.

> "I like to think of myself as an old-school dentist using cutting-edge technologies."

I strive for perfection, and yes, perfection is not always attainable. However, you can get pretty close to it if you concentrate your energy and use your skill set for doing the best work possible. When I look at a patient's smile, I am not only looking at the size and shape of his or her teeth. You can take a perfect set of teeth and put it in someone's mouth and he or she will suddenly look off. A smile depends on the harmony with the face shape, lip shape, lip line, nose and chin position. A beautiful smile depends on so many different things, and I look at all aspects when I am restoring a smile.

Many patients have resorted to DIY dentistry during the lockdown. What is your opinion about attempting to perfect a smile at home?
I was recently asked by the magazine *Allure* about whitening solutions made at home. My advice is to remain cautious about doing any home remedy type of treatments, be it buying mail-in aligners, using a nail file to help fix a chipped tooth, moving teeth or treating teeth, since these are all delicate procedures. DIY dentistry has gone wrong too many times for me to condone it. I have seen an excessive use of baking soda and acids to whiten teeth that eventually lead to tooth erosion and enamel demineralisation. More recently, with the surge of the mail-in clear aligners that are being vigorously promoted on social media and in some podcasts, I have seen some devastating malocclusion as a result of patients moving their teeth without being under the care of a dentist.

Dr Rhonda Kalasho believes that a smile should not overpower a person's face. Therefore, she recommends that her patients stick to natural smile enhancement treatments. *(All images: © Rhonda Kalasho)*

Moving teeth is not as simple as shoving teeth into a straight line—you need to look at the root morphology, the periodontal status, the bone quality, existing restorations, and evaluate the patient's cephalometric parameters in order to deliver the most aesthetic, long-lasting results within the available standard of care. I have seen patients no longer able to close on their posterior teeth because they purchased clear aligners without being under the direct care of a dentist. They then had to pay so much for additional dental treatments just to regain their functionality, which defeated the purpose of trying to save money by going the cheaper route in the first place. Leave dentistry to the professionals.

> "Social media often influence people into thinking that they can all do cosmetic dentistry."

COVID-19 has had a major impact on dental practices worldwide. How has it changed your day-to-day work and the way you treat your patients?
Since I perform extractions and root canals, I treated a lot of emergencies during the shutdown. I was part of the Los Angeles Dental Society task force for reopening, and I managed to acquire all the necessary personal protective equipment (PPE) in order to perform emergency dental services safely. We cut our patient load during that time by over 70%. However, it was more exhausting having to treat patients under the stress and fear of contracting the virus while wearing such heavy gear.

We have taken extensive precautions at the office, not only in wearing the proper PPE, but also in using extra-oral suction with every patient during treatment and making sure that only one patient is in the waiting room at a time. The sterilisation technique is increasingly extensive and thorough, and we test our staff at a certified laboratory for COVID-19 every two weeks. We still provide the same great quality of care we always have done, just with some more gear.

In your opinion, what will be some of the biggest challenges facing cosmetic and restorative dentistry over the next five years?
One of the challenges is convincing people who want to look like their favourite social media filter that super-white square boxy teeth are not aesthetic. As more and more dentists who have not studied the art of symmetry and ceramics are performing low-quality veneers or crowns, you will see more of these low-quality ceramics that are bulky and too opaque. These bulky crowns generally lead to periodontal disease and recurrent caries.

Social media often influence people into thinking that they can all do cosmetic dentistry. However, my strongest suggestion is that everyone who is treating in the cosmetic arena must be trained in the periodontal maintenance of the patient and the dental materials involved in high-quality ceramics. The challenge rests mainly on the education that so many dentists are not willing to embark on. Continuing education is incredibly important if you want to deliver the highest-quality service to patients.

What is the best advice you can give to your patients seeking to enhance their smiles?
Every smile is beautiful. If you have a gap, small teeth or gingival hyperplasia or if you have some crowding, keep in mind a smile is not one-size-fits-all. Stick to what looks natural. Chiclet teeth or those overly white veneers or crowns that look so incredibly unnatural will never be in style. I always tell patients to think of the most beautiful person they know, and every time I ask them to name the person, every time, without fail, that person's smile is natural and not overwhelming. Enhancing your smile means just elevating what you have and getting a colour that matches your skin and hair and creating teeth shaped to match your face and lips in order to achieve an overall harmonic appearance that will not overpower your face.

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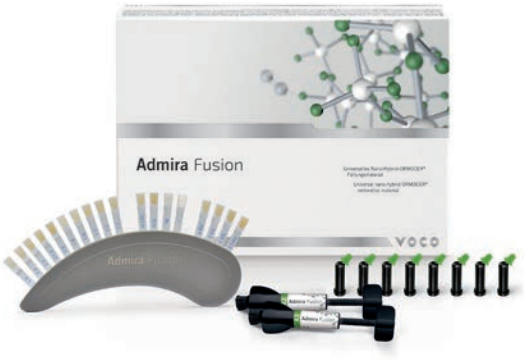

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LipLase for fuller, smoother lips with no downtime

Dr Harvey S. Shiffman, USA

One of the fastest-growing industries in the world is facial aesthetics. Yes, beauty might be in the eye of the beholder, but beholders tend to agree. While beauty may be skin deep, its effects run far deeper. A long-standing cliché advocates to not judge a book by its cover, but people do judge books by their covers, as well as people by their appearances, especially by their physical attractiveness.

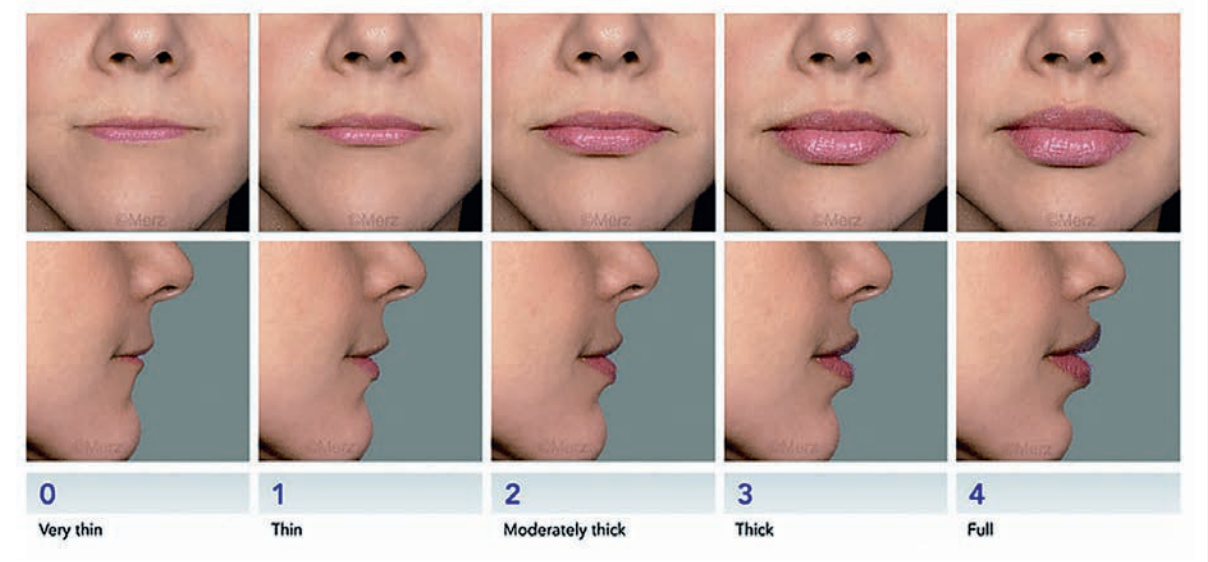

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Fig. 1: Upper and lower lip volume scales (Merz Aesthetics).

In 1985, Dr Gordon Patzer published the *Physical Attractiveness Phenomena*, in which he defined these as "the collective realities of physical attractiveness", which tend to be complex, powerful and pervasive, discomforting and unfair, and despite different notions of physical attractiveness, transcend culture, time and geography. Dr Patzer states that the "components of the face do not contribute equally to the evaluation of physical attractiveness". There is a hierarchy in that some components are of greater importance. There are five dominant factors, of which all are facial components, and these components in order of priority are the teeth, smile, lips, eyes and nose. The focus of this article will be the lips, including the modification, rejuvenation and correction of symmetry and so much more using the Fotona family of lasers.

A natural approach for lip rejuvenation

As the world population continues to age and our concern with aesthetic appearance increases, more and more clinicians and practitioners are looking for options to offer their patients a natural approach to improving their appearance. When it comes to the lips, age-related changes include loss of volume, perioral wrinkles and fading into the face. When developing a strategy for lip rejuvenation, it is important to understand the anatomy and mechanisms of tissue breakdown. After the age of 25, we lose 1.5% of our collagen synthesis per year. This decrease in collagen production is compounded by an increase in degradation. Matrix metalloproteinases, such as collagenase, are induced by ultraviolet (UV) exposure and factors such as smoking and dietary toxins and are capable of degrading extracellular matrix components. Histologically, this is characterised by irregular and disorganised collagen fibres. These collagen bundles are also more highly cross-linked than is seen in more youthful skin. The ratio of collagen types also changes, having a predominance to Type III collagen with less elasticity. The most dramatic loss of collagen is in the upper third of the dermis, presumably related to the depth of UV penetration into the skin.[1] The lips are significantly more susceptible because of the thin epithelial layer and should be protected.

The traditional indications for using lasers in facial aesthetics include advancing age-related and lifestyle-related loss of facial volume, reduction in elasticity and skin or lip dryness, all of which are caused by loss of collagen. Today, many patients are benefiting from the use of laser therapy to maintain a youthful appearance and prevent facial ageing by stimulating collagen and maintaining collagen formation. Use of lasers in aesthetics includes both ablative (tissue removal) and non-ablative types. In the 2000s, Fotona released the SMOOTH mode protocol, a non-ablative Er:YAG fractional laser pulse modality that results in much shorter recovery times. Fotona's proprietary SMOOTH mode pulse modality creates no bleeding and allows for precisely controlled deposition of heat into the tissue. The optical/thermal energy is delivered in a unique sub-second-long pulse sequence, which prevents heat build-up on the surface, but achieves homogeneous heating by thermal diffusion down into the lamina propria level of the tissue. The lamina propria layer is where the fibroblasts are the densest and where, through generation of new collagen, collagen and elastin are formed.

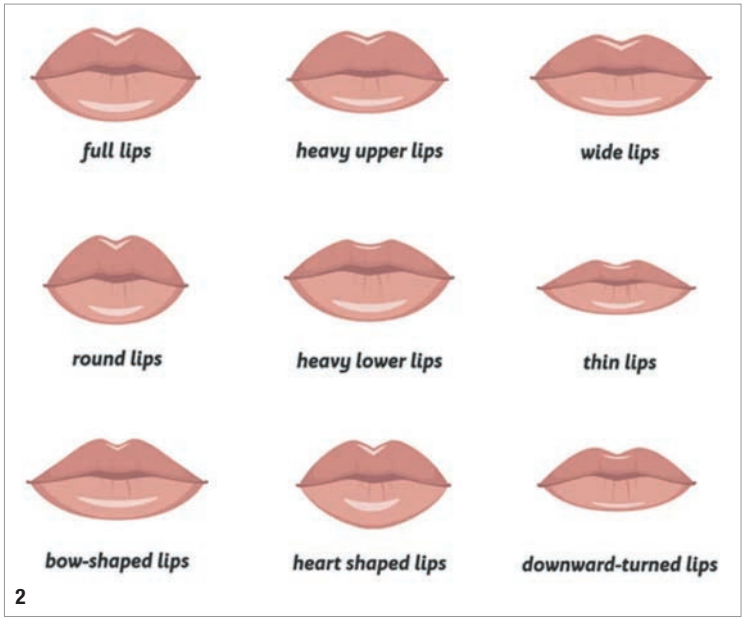


Fig. 2: Lip shape choices for modification.

Fotona's LipLase procedure was created to address the rapid increase in demand for restored and or plumper lips. LipLase fulfils this need with minimal downtime,

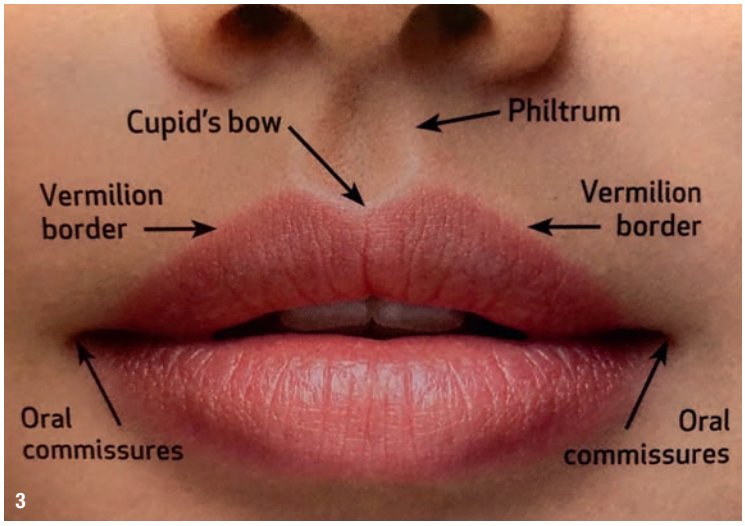
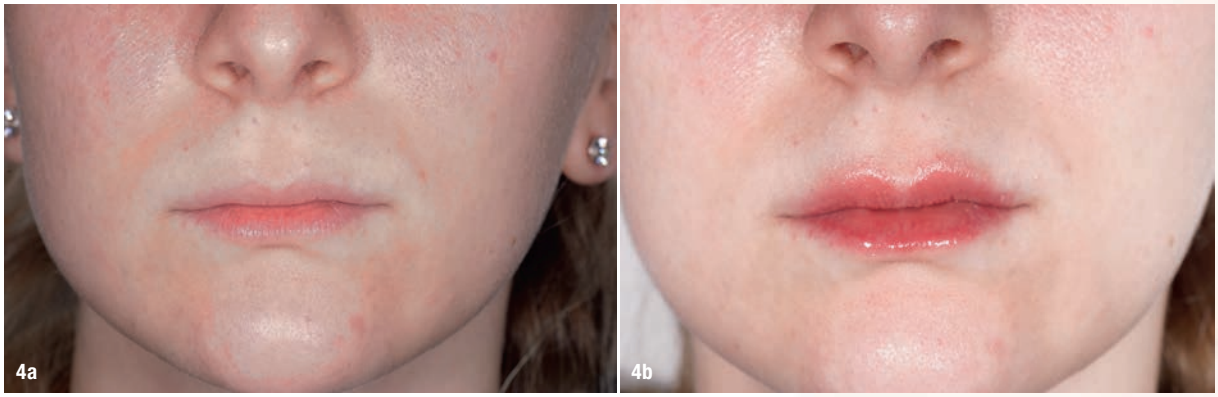


Fig. 3: Anatomical structures of the lips.



Figs. 4a & b: LipLase case before **(a)** and after three treatments **(b)** showing modified volume and shape of the lips.

anaesthetics and postoperative discomfort. The result is fuller, smoother lips, collagen synthesis stimulation and remodelling. The patient will see an immediate response, the plumpness increasing as the treatment continues. Of utmost importance is to monitor the tissue response to avoid overtreatment.

LipLase goes through three phases, starting with the inflammatory stage, where a series of vascular, cellular and biochemical events occur and water increases in the lips, resulting in an immediate plump as a response to the tissue heat-shock. The extent of lip plumping will be slightly more than the resulting long-term result, so a slight over-plump is suggested. The second phase is a light surface peeling, resulting in the exposure of fresh, younger-appearing tissue. The third phase is the phase in which new collagen is formed.

Expectations and treatment planning

Most of our aesthetic patients have a specific idea of what they want, and because of this, the most successful aesthetic consultations have involved handing the patient a large hand mirror and asking him or her what makes him or her unhappy about his or her facial features. Once the patient has expressed this desire, we review his or her concerns and reconnect the patient with realistic expectations. We use the Merz lip grading protocol to establish the starting point for treatment (Fig. 1) and then we provide the patient with a colour copy of the various lip shape diagrams (Fig. 2) as a point of discussion. Patients desire volume and symmetry or sometimes correction in specific areas and shape change.

Thorough photographic documentation is essential both for treatment planning and for medico-legal documentation of the existing condition before the treatment is started. We also include postoperative photographs at each appointment and then again at the follow-up appointment, 21 days after the last treatment of a series. Knowledge of photography is important in aesthetics, as a cell phone camera is not adequate for facial aesthetics owing to wide-angle distortion. We try to have the photographs up on a large monitor (greater than life-size) during the consultation, as magnified images greatly help the patient scrutinise the images during the discussion.

Equipment

The hardware necessary to provide this procedure is from the Fotona family of lasers (Dynamis/Spectro family, TimeWalker Fotona4D, LightWalker), employing the proprietary Er:YAG SMOOTH mode pulse modality. There are no other lasers on the market that can reproduce this effect in the same way. These lasers have two different wavelengths built in: Nd:YAG, which is absorbed in pigment and haemoglobin as its main chromophores, and Er:YAG, which has a high absorption in water as its primary chromophore. These two wavelengths are some of the most researched wavelengths in laser aesthetics. For the LipLase procedure, the handpieces required are the PS03X, PS03 or FS01 (for the Dynamis/Spectro family of aesthetic lasers) or the PS04 (for the LightWalker dental laser). These handpieces are patterned or fractional and produce an array of deep microscopic thermal injuries that stimulate more repair and new collagen formation.

Treatment protocol

The LipLase protocol is initially a restorative treatment that ramps up over the course of treatments. LipLase involves primarily treating the mucosal aspect of the lips intra-orally first to obtain good lip support, then moving out to the dry part of the lip up to and including the vermillion border (Fig. 3). The necessary energy settings are different for the wet and the dry parts of the lip. Patient sensitivity will increase dramatically on the dry part of the lip if it is allowed to desiccate or the plume control evacuation too close. Rehydration with warm saline or water is very important. Using chilled solutions will defeat the focus of the treatment (deep thermal effect).

The handpiece of choice must be kept at a 90° angle with the tissue to enable optimal thermal energy penetration. The mucosal aspect is treated from right to left, with six SMOOTH mode pulses per spot, keeping the hand steady to drive the heat into the tissue (usually no overlap is needed). This is then repeated a total of six times. On the dry part of the lip, the protocol and energy settings drop, and two to four SMOOTH mode bursts per spot and two to four passes are used, based on the patient's desired volume. The commissures should not be treated. Once a plump has been achieved, we can evaluate the shape and any deficits. Pharmaceutical-grade vitamin E oil or coconut oil should be applied immediately after treatment, but no pigmented lipstick or lip gloss for four days. Lip products of a sufficient Sun Protection Factor should be used afterwards to prevent UV damage. The treatments are on a 21-day cycle, as that is biologically what is needed for the thermal injury and repair cycle.

Results

Clinical experience has shown that patients in their twenties to forties plump faster, but tend to need maintenance after three to four months. In contrast, patients in their fifties to eighties take more time to plump, but the plump will last for more than six months. Maintenance schedules are an important preconsent discussion for treatment, as they are an additional expense. Typical re-treatment is every three to four months to maintain the plump without significant loss and usually involves one treatment. Patients who go over six months may require more than one treatment, as this requires restoration of the plump as opposed to maintenance thereof. Typical results are shown in Figures 4 and 5.

Conclusion

In conclusion, we have found the LipLase procedure to be an effective aesthetic, restorative and corrective procedure. If done correctly and with adequate training, it is a safe procedure for both male and female patients.

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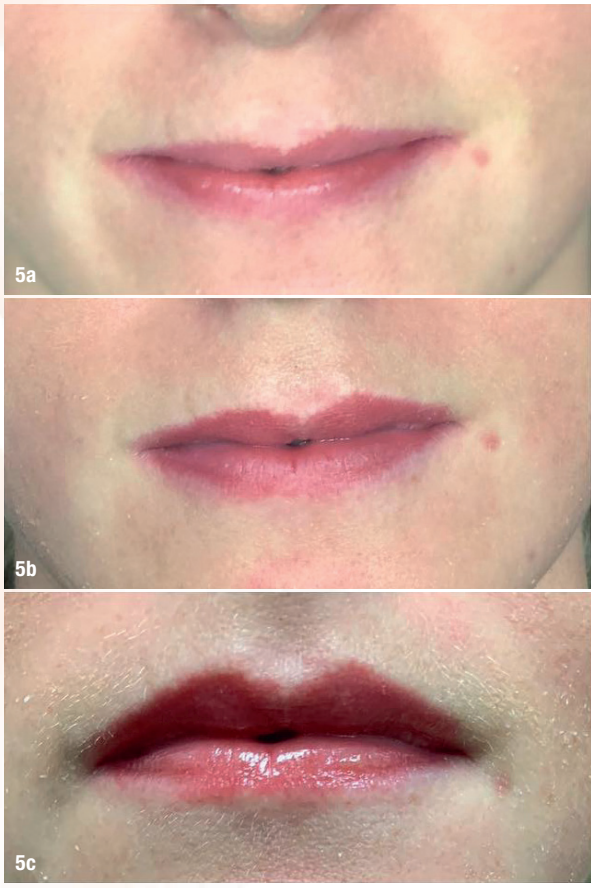


Figs. 5a–c: LipLase case pre-op **(a)**, after one treatment **(b)** and after three treatments **(c)**, showing volume and shape change.

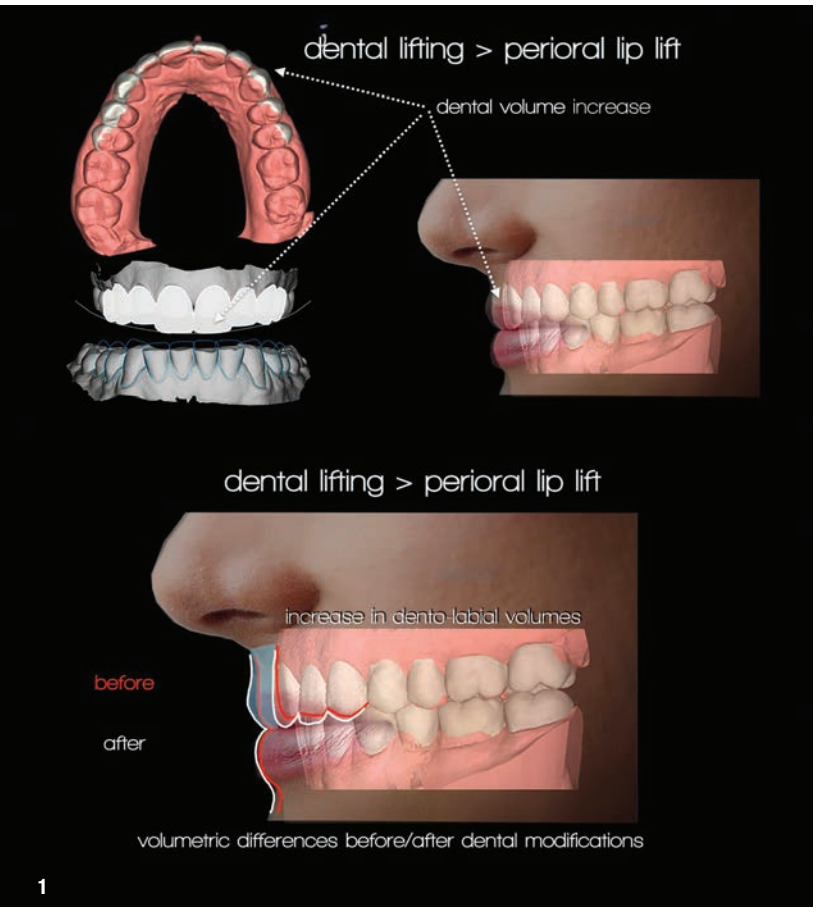
about

Dr Harvey S. Shiffman was born and raised in New York and is a graduate of the former Georgetown University School of Dentistry in Washington in the US. He then completed a general practice residency at Georgetown University Medical Center in Washington with an emphasis on treating medically compromised patients. Dr Shiffman completed his certification with the Academy of Laser Dentistry in three types of laser systems, bringing new technology to the practice, which can offer numerous enhancements to standard procedures and many new and exciting options. Dr Shiffman was recently awarded a fellowship in the Academy of Laser Dentistry. He is personally involved in the use and development of cutting-edge technology and has performed thousands of laser procedures in the last ten years. Dr Shiffman's dental practice, Boynton Laser Dental Center, is in Boynton Beach in Florida in the US.

Functional aesthetic speech therapy

Synergy between dentistry and aesthetic medicine?

Drs Valerio Bini, Andrea Piccardi & Gabriele Maria Marzola, Italy



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Introduction

Aesthetic medicine is increasingly taking on a global connotation of harmony and balance, defined certainly by historically evolved and shared canons, but progressively corresponding to a biopsychosocially functional profile.[1] From this perspective, different practices find common grounds of expression, aimed primarily at the interdependence between structure and function, constituting a dynamic functional unit which possesses characteristic and integrative links.[2] In this article, we will take a deeper look at the contributions of speech therapy to facial aesthetics[3] and to the reorganisation of stomatognathic functions[4] in synergy with aesthetic medicine and aesthetic dentistry[5] and in response to the aesthetic patient, deeply interlinked with personal life experience—the most intimate emotions linked to the self and identity.[6]

The current state of affairs

Speech therapy deals with the physiopathology of human communication in its most diverse forms and, for reasons also of a practical nature, it has expanded its scope over time to various areas of intervention, including the study of oral functions.[7] In this innovative evolution, the Conselho Federal de Fonoaudiologia (Brazilian federal council of speech therapy) has regulated the application of orofacial motility for aesthetic purposes,[8] thus identifying a new possibility of use to evaluate, prevent and stabilise mimetic facial and/or cervical muscles, seeking the symmetry and harmony of the structures involved, with aesthetic results. Myofunctional intervention is considered a new objective of speech therapy intervention concerning aesthetics, with its own foundations and principles, and is aimed at the attenuation of expression lines that inevitably appear.[3] This area naturally integrates with the typical skills and objectives of the established protocols of aesthetic medicine and aesthetic dentistry. In this regard, various authors have extensively studied the influence of dentofacial aspects on physical attractiveness and self-esteem, and they have clearly demonstrated how dental morphology and related aesthetics play a fundamental and decisive role in the perception of beauty and, indirectly, in the determination of the social success of an individual. The physical aspect, self-esteem and the ability to engage in interpersonal relationships are deeply interrelated. Therefore, it is possible to suggest that facial structure, primarily that of the lower third of the face, has a great psychological and aesthetic impact and can certainly be more relevant than dental morphology alone.[6]

Ageing

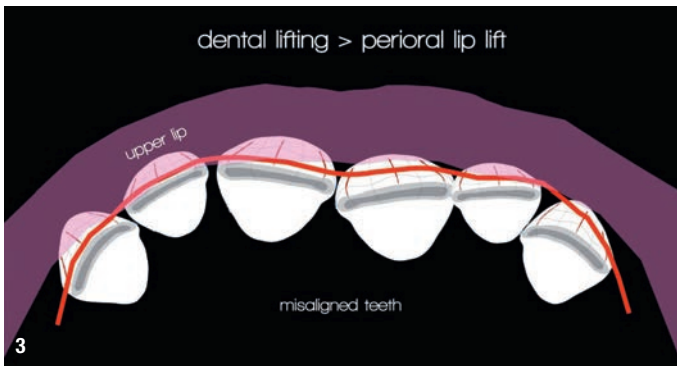
Ageing is a process that causes an imbalance of homeostasis and greater vulnerability of the organism, as well as a reduced adaptation to environmental stimuli, and it affects cells, tissue and organs.[9] Anatomically, ageing is determined by the multiple effects of the passage of time and the effect of gravity on the skin, soft tissue, and superficial and deep components of the face, and their mutual influences and volumetric alterations.[10] Facial ageing is also determined by the interactions and relationship with the external environment of bones, muscles, ligaments and skin, especially the combined effects of gravity, bone resorption, decreased elasticity, loss and displacement of components, and superficial and deep subcutaneous fat.[11] These relationships between

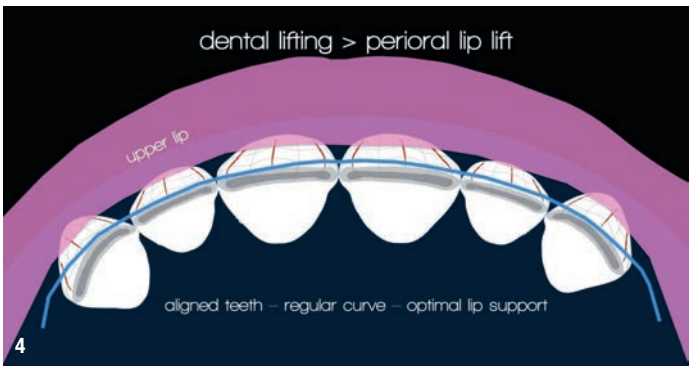
tissue are mostly represented in the lower third of the face and the perioral area, so the study and treatment of these areas is of fundamental importance in aesthetic and anti-ageing practices concerning the face. In fact, the dislocation of panniculus adiposus related to the collapse of the superficial musculo-aponeurotic system (mimetic facial muscles) and reduced muscular tropism of the perioral area[12] results in a substantial acceleration of chrono-ageing, which, being genetically determined and hormone-sensitive, remains difficult to approach directly. Also, the deterioration of these structures worsens the incidence of photoageing, which is mostly determined by the relationship of the individual with the external environment[13] and his or her socio-existential habits (exposure to sun, diet, consumption of stimulants, physical activity, work, other lifestyle factors, etc.), making it difficult to control by professionals in its triggering components.[14]

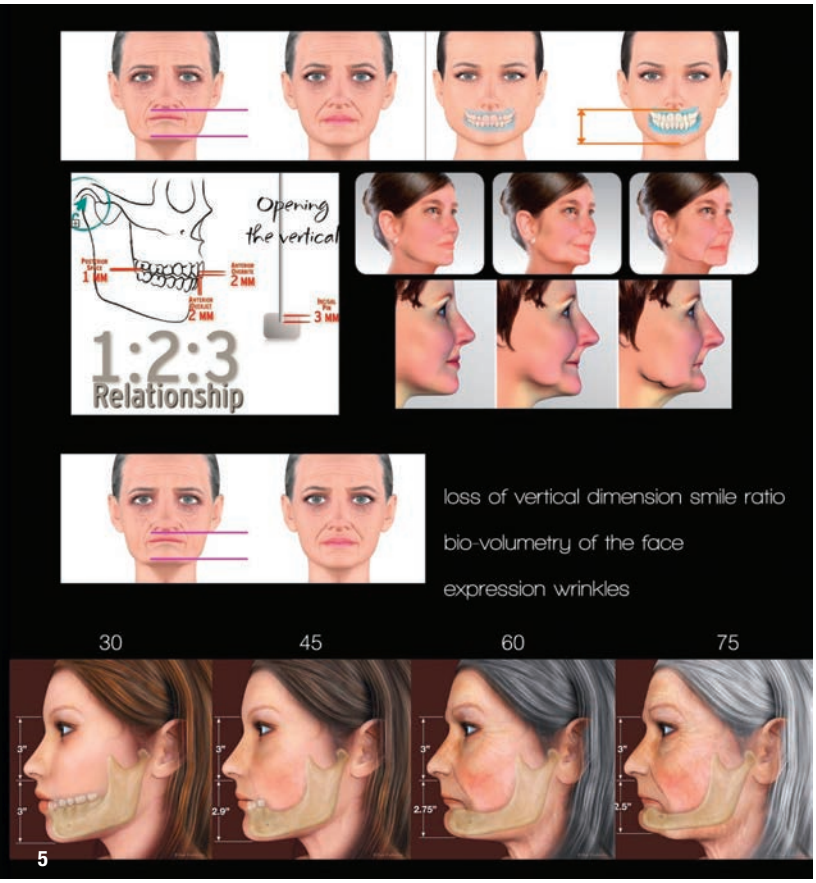
Consequently, the study of the muscles of the lower third of the face and the related muscles and tissue changes becomes fundamental[15] to physiological functions such as mastication, breathing, posture and facial expressions; to para-physiological conditions such as loss of vertical dimension (Fig. 1), collapse of the superficial musculo-aponeurotic system, preferential mastication, preferential sleeping side and chronic unilateral incidental sun exposure; and to pathological situations such as bruxism, previous injuries and trauma, loss of teeth or masticatory tissue, speech or language dysfunction, and disordered breathing.[16] Just as the excessive contraction of the superficial mimetic muscles can promote the formation of wrinkles, so too can dysfunction of the stomatognathic system, consisting of a complex system of organs and tissue responsible for carrying out the respiratory, mastication, swallowing and communicative functions, cause chronic and repeated muscular contractions. The dysfunction of the respiratory, mastication and swallowing processes is characterised by a multifactorial aetiology and, with structural or functional involvement, is closely related to the expression lines on the sides of the mouth, thus resulting in specific postural attitudes. For these reasons, a single treatment is often ineffective. A synergistic approach between the dentist, speech therapist and aesthetic doctor addresses the problem with renewed therapeutic force, allowing better control of the formation of wrinkles and skin sagging and providing good mutual support in the clinical journey.

Dentistry and speech therapy

Several authors have demonstrated how effective a multidisciplinary vision and practical approach to the aesthetic clinical dentistry case are. In 2013, Bini proposed a facial aesthetic medical team (Fig. 2), a team of specialists that collaborate through a digital preview, an accurate multidisciplinary approach that has now been updated concerning aesthetics by providing for the involvement of speech therapy. The importance of the functional and aesthetic unit, such as the face and the smile, demands the most meticulous analysis of the harmony and beauty relationship, and the aesthetic patient, dysfunctional or not, must be motivated by this type of approach; without patient compliance, no prescription will be successful. The diagnostic and therapeutic process, as already well established and consolidated between orthodontists and speech therapists, must suggest the importance of orthodontic therapy for smile aesthetics related to increasing self-esteem in addition to the psychological and psychophysical well-being of the patient. The coordinated movements of all the orofacial muscles, as well as the posture of the tongue in the oral cavity, are essential for the physiological performance of the functions of breathing, mastication, swallowing and phonation, which is why in disease prevention and orthodontic therapy they are sometimes linked to facial aesthetic disharmonies. There is also a specific myofunctional intervention aimed at rebalancing oral function. From an early age, orofacial muscle imbalance contributes to the genesis of dental-skeletal abnormalities and the dysfunction of the temporomandibular joints, manifested above all by imbalances in adulthood. Therefore, the critical role that orthodontics plays should not be overlooked in adults as regards the most modern therapies characterised by digital design and therapeutic finalisation by means of clear aligners. This is so even when the clinical case has a more cosmetic purpose, such as







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minimal tooth movements intended for simple alignment of the parameters useful for improving the smile, that is, the possible modification of shapes and sizes of the post-orthodontic dental clinical crowns or simply the objective of conservative direct or indirect additive restorations. In this regard, clear aligners, aesthetic veneers, conservative additive restorations, prostheses and implant prostheses possess a series of features that characterise such treatment as an aesthetic approach.

As a matter of fact, we must consider that any changes in positioning and volume of natural teeth and/or prostheses related to the 3D dimensions of other intra-oral tissue, such as bone and gingivae, can induce new bio-dimensional aesthetic such as stretching of vestibular tissue, increase of the vertical dimension with the consequent new dentolabial approach, and lifting of a lip induced by functional composition (Figs. 3 & 4), and phonetic and sublabial aesthetics related to dentistry. Static aesthetic analysis (photograph), dentolabial dynamics (video) and articulatory evaluation (audio) are decisive in the phase of consultation between the team's specialists to be able to record any defects or functional and structural abnormalities in particular. It is essential to establish in a rational and economic manner the phases of the therapeutic process. Therefore, considering the aesthetic results, it will prove useful to foresee in the diagnostic stage any need for speech therapy before, during or after dental treatments.

The characteristics of the treatment process

In promoting facial harmony, which is understood as the highest degree of aesthetic and functional balance, it is essential to intercept the cause–effect relationship that exists between the equilibrium of the stomatognathic system, muscle function and the skin.[17] Speech therapy intervention cannot be separated from an accurate initial multidisciplinary evaluation with the dentist and aesthetic doctor that is very often objectified through the use of digital images.[6] High-resolution videos are essential, capturing the morphological and postural aspects of the following in a static and dynamic state: the face (posture, lips, tongue, dentition, occlusion, hard palate, soft palate, nostrils, eyes); tone (lips, tongue, cheeks, chin); proprioception; mobility (lips, tongue, jaw); stomatognathic functions (breathing, mastication, swallowing); facial symmetry; lifestyle habits; communication and eating habits.[18] Based on the information gathered and the relationships observed between creases, wrinkles and oral imbalances, a personalised therapeutic process is proposed and articulated in different areas[3] and can be treated directly within the dental practice (Fig. 5).

Elongation and relaxation of the oral and perioral muscles through massage of the musculature (small massager roller and small vibrating device), and isometric and isotonic exercises derived from orofacial motility[19]

They act specifically on the different muscles of facial expression (orbicularis oris, levator labii superioris, levator labii superioris alaeque nasi, zygomaticus minor, levator anguli oris, zygomaticus major, risorius, buccinator, depressor anguli oris, depressor labii inferioris, mentalis, platysma, orbicularis oculi, occipitofrontalis, procerus, corrugator supercilii, nasalis). Massages, stretches and specific movements seem to promote increased blood circulation, tissue oxygenation, greater balance and muscular balance, and an increase in proprioceptive skills, all decisive in the reduction of the feeling of tension and fatigue.

Postural modification

Starting from the shared physical examination, we look for spontaneous labial occlusion, for the correct positioning of the lingual apex on the incisive papilla (in compliance with the relationships existing between structural and functional elements), and for postural balance in the head and neck region.

Rebalancing of stomatognathic functions

Through motor learning principles,[20,21] priority is given to nasal breathing,[22,23] bilateral alternating mastication,[24,25] functional swallowing[26,27] and balancing of temporomandibular joints.

Elimination of compensatory movements

Expressive mannerisms and dislocated tensions, possibly resulting from non-verbal communication, are normalised.[28]

The phases of intervention

The principle underlying treatment is the close connection between expression lines and orofacial muscle use over time. A structured course of action is therefore proposed,[3] in consultation and integration with the dentist and aesthetic doctor, regarding the clinical process to be followed promptly:

1. Taking of a joint medical history (aesthetic doctor, aesthetic dentist, speech therapist) and evaluation of the stomatognathic system: Collaboration between the different specialists and the interdisciplinary vision, as well as the capture of digital images processed by software such as Invisalign's ClinCheck and Aesthetic Digital Smile Design,[29] allows one to better individualise the treatment plan, which, thanks to the advent of digital dentistry, can create a standard result predictive of an optimal clinical outcome.
2. Holding of a session aimed at providing information on the proper functioning of the stomatognathic system and the structures involved.
3. Implementing of an intervention process of eight consecutive sessions, on a weekly basis, in which the patient acquires skills and autonomy in the daily performance of the different activities: In this regard, a daily work programme that the patient carries out independently for the duration of treatment is agreed on.
4. Holding of additional in-depth or control sessions.

Thanks to the stable acquisition of new skills, the patient will be able to proceed independently once the treatment process concludes.

Conclusion

The available literature on the clinical outcomes of different facial rejuvenation approaches through manipulation of the orofacial musculature is currently represented by single case reports and small case series and generally shows positive results.[30–34] Isometric, static, dynamic exercises, massages, and specific manoeuvres seem to help prevent and reduce facial wrinkles. The following were specifically observed: reduction of wrinkles around the eyes, thinning of expression wrinkles, thinning of forehead wrinkles, volumetric and increased definition of the lips, increase in the tone of the cheeks, reduction of wrinkles on the neck, reduction of the nasolabial fold, increased skin tone, symmetry of the eyes, improved muscle tone, greater mandibular definition, adequacy of stomatognathic functions and attenuation of the signs of ageing. However, these positive findings must be interpreted in light of the procedures adopted for collecting the results, mainly based on self-assessment questionnaires and conclusive clinical evaluations,[35] as well as in light of the very few clinical studies available which provide comparative pre- or post-treatment statistical data.[32,36]

Therefore, a multidisciplinary intervention-based approach to the aesthetic patient seems even more promising. Such an approach can co-exist with proven mainstream approaches to aesthetic medicine and aesthetic dentistry. In conclusion, it remains essential to promote new interdisciplinary protocols between professionals in the three fields, under the direction of the dentist or aesthetic doctor, who, alongside the established aesthetic speech therapy-integrated solutions, can use this multidisciplinary approach to address facial ageing and promote the best degree of functional balance and aesthetic harmony. Thanks to the study of the new protocols proposed and further alternatives, it will be possible in the future to have a better statistical evaluation of the clinical evidence of the speech therapy approach in significant samples to enrich the current literature, in which this approach has been under-represented to date.

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

about

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Inspired by the Maya—skull and tooth reconstruction with 3D printing

Dr Yassine Harichane, France

Temple of Kukulcán.

From time immemorial, people have attempted to transcribe their knowledge. Whether on stone, paper or wood—the various civilisations of our world have employed different media to share their culture. The Mayan civilisation was no exception. A Mayan codex is an encyclopaedia that includes the knowledge and capabilities of this ancient culture, including even dentistry. The following scientific article presents the reproduction of Mayan teeth using 3D printing and various composites.

A Mayan codex in the form of a concertina folding book presents and contains glyphs and representations that together tell a story. This globally unique story deals with their beliefs, practices and rites, but also their sciences. As a matter of fact, Mayan civilisation had a command of architecture, medicine, pharmacology and even dentistry. Unfortunately, this knowledge went up in flames with the conquistadors. The Mayan codices were held to be sacrilegious, for which the only means of purification was fire. Consequently, the priests burnt the Mayan records. Today, only three Mayan codices survive; however, two of them are in such poor condition that they cannot be handled. The third Mayan codex, which is regarded as the most beautiful and best preserved, is in safekeeping at the Technische Universität Dresden in Germany.

Chichén Itzá is a Mayan city, famous today for its archaeological sites, including the Temple of Kukulcán. What many tourists do not know is that the Dresden Codex is also from this Mayan city. This codex, however, only contains information relating to the Mayan calendar. It makes no mention of sciences such as dentistry. However, we possess artefacts that document that the Mayans performed dental treatment not only for therapeutic but also for aesthetic purposes. There is currently no way of bringing back from the ashes a Mayan codex burnt 500 years ago, but we do have the technology to reconstruct 1,500-year-old artefacts. In this article, we will show how we managed to reproduce Mayan teeth using digital tools.

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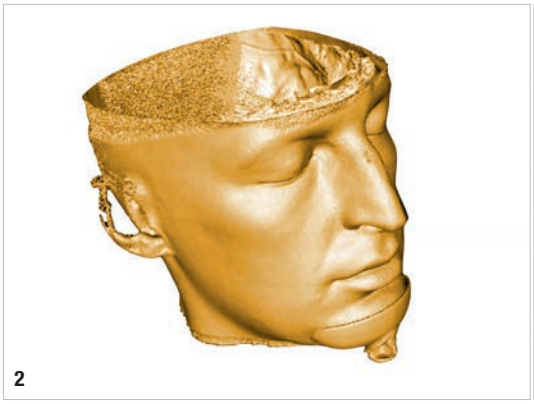

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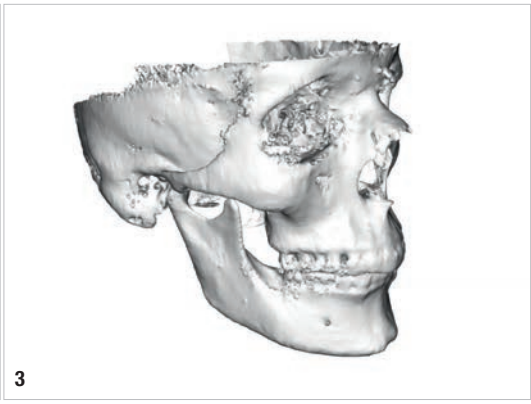

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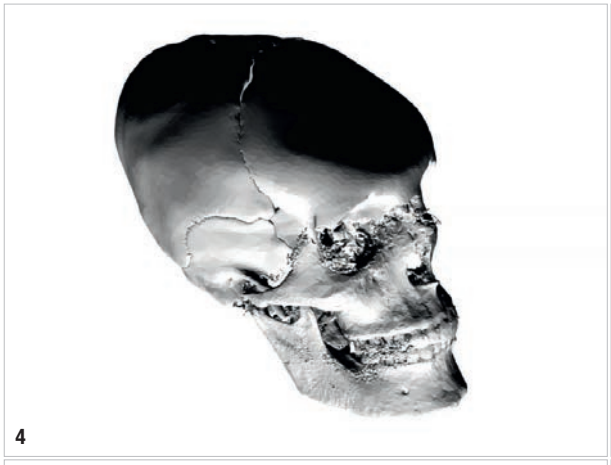
Fig. 1: A Mayan child with growth plates. **Fig. 2:** Facial reconstruction. **Fig. 3:** Reconstruction of the skull.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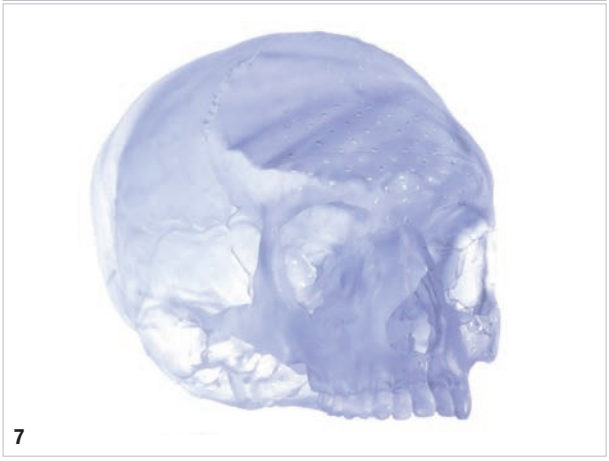
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Fig. 4: Virtual Mayan skull. **Fig. 5:** SolFlex 650 (VOCO). **Fig. 6:** V-Print splint (VOCO). **Fig. 7:** Mayan skull printed in 3D.

Mayan skulls

Surprisingly, the Maya already practised craniofacial orthopaedics in their day. When we look at the skeletons today, we can determine that these people had a particular profile. The skull was elongated and lengthy, the forehead receding and the bridge of the nose even with the forehead until it reached the crown of the head. These craniofacial criteria were the result of a ritual practice: women applied rigid plates to the heads of their children that were bound together in order to steer craniofacial growth (Fig. 1). The Maya employed fontanelles, tissue areas between the skull bones, to shape the heads of their young children. The result was a flattened skull in the forehead and occipital bone, as well as an overall egg-like shape. This arbitrary deformation was not performed for therapeutic reasons, but rather for aesthetic purposes. It was a cultural practice that permitted the ethnic and social group of the individual to be identified.

3D-printed Mayan skull

We attempted to synthesise a Mayan skull with the latest technology. To do so, we took three main steps: data acquisition, design and printing. The acquisition step consisted of using data acquired by cone beam computed tomography (i-CAT, KaVo Kerr). We worked on a scan from our database, for which the patient gave his consent. The result was a DICOM file that included all the information on tissue density (Fig. 2). Consequently, it was possible to practically remove all the soft tissue, just leaving mineralised tissue, such as bones and teeth (Fig. 3).

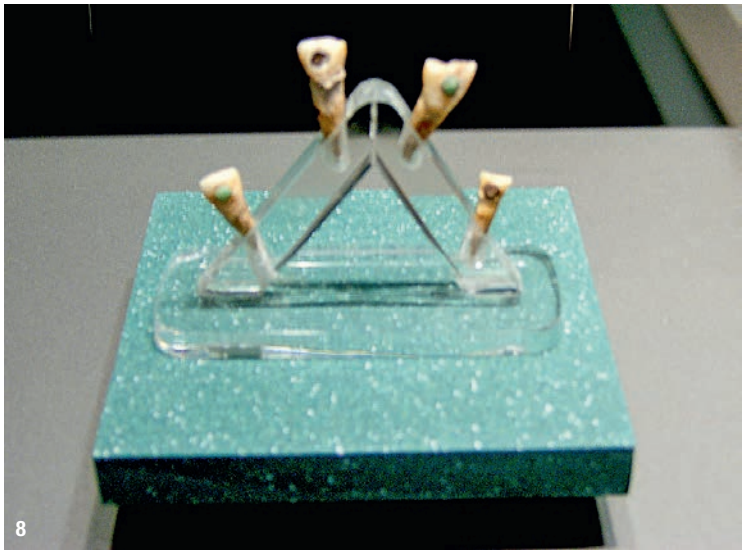
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Fig. 8: Mayan teeth.

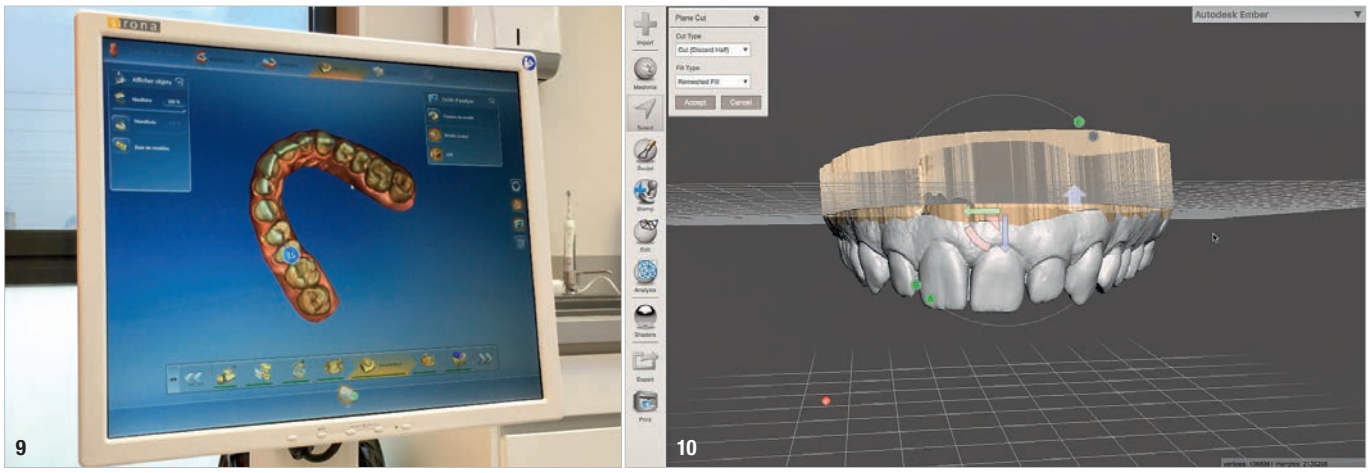

Fig. 9: CEREC Omnicam intra-oral scanner (Dentsply Sirona). **Fig. 10:** Virtual sectional plane of the dental model base.

We isolated the skull of the patient and exported it to an STL file. The design step included importing the STL file into 3D-modelling software in order to distort the skull virtually. The frontal bone was flattened, ensuring that the nose tip was in contact with the crown of the head. The occipital bone was less curved, in order to simulate the effect of a rigid plate behind the head. Finally, the skull was modified to give it an overall egg shape. This resulted in a skull that met the canons of Mayan beauty (Fig. 4). The digital file was sent to a 3D printer (SolFlex 650, VOCO; Fig. 5) loaded with transparent resin (V-Print splint, VOCO; Fig. 6), to reflect the internal bone structures better. This produced a transparent skull with fine details and a global shape (Fig. 7), which resembles the Mayan skulls on display in museums.

Fig. 11: SolFlex 170 (VOCO).

Mayan smiles

Mayan skeletons have been closely examined by multidisciplinary teams of anthropologists as well as by dentists. The teeth do in fact reveal special modifications: they are filed, striated or studded with precious stones (Fig. 8). The changes in shape may include the incisal edges, the vestibular surface, and the mesial and distal angles of the teeth. The inlays are composed of various stones: jade, obsidian, serpentinite, haematite, etc. However, one should bear in mind that these changes were confined to the smile, that is, chiefly the anterior teeth and normally the buccal surfaces of the teeth. These operations were performed for aesthetic purposes. The teeth were both a symbol of social identity as well as an adornment. The most surprising thing is that these interventions were performed with such mastery that, for example, 1,500 years later, the teeth and even inlays still exist. Consequently, these artefacts are the ultimate proof that a dental intervention can be both cosmetic and permanent.

Mayan wax-up

We were able to reproduce three artefacts of the Mayan smile with the technological tools currently at our disposal. The previous steps, acquisition, design and 3D printing, were used in order to digitally produce a wax-up and two mock-ups. The first step required the use of an intra-oral scanner (CEREC Omnicam, Dentsply Sirona; Fig. 9). The maxillary arch of a patient was scanned down to the tiniest detail in order to produce the most realistic artefacts possible. The scan was exported as an STL file to facilitate easy processing by the software. In a second step, a plannable basis was created for the 3D printing of a dental model, using modelling software (Fig. 10). This was printed directly in 3D (SolFlex 170 and V-Print model, VOCO; Fig. 11) in order to preserve the patient's dental arch (Fig. 12). To optimise the light polymerisation, the model was placed in an ultraviolet flashlight device (OtoFlash, VOCO; Fig. 13). The wax-up was

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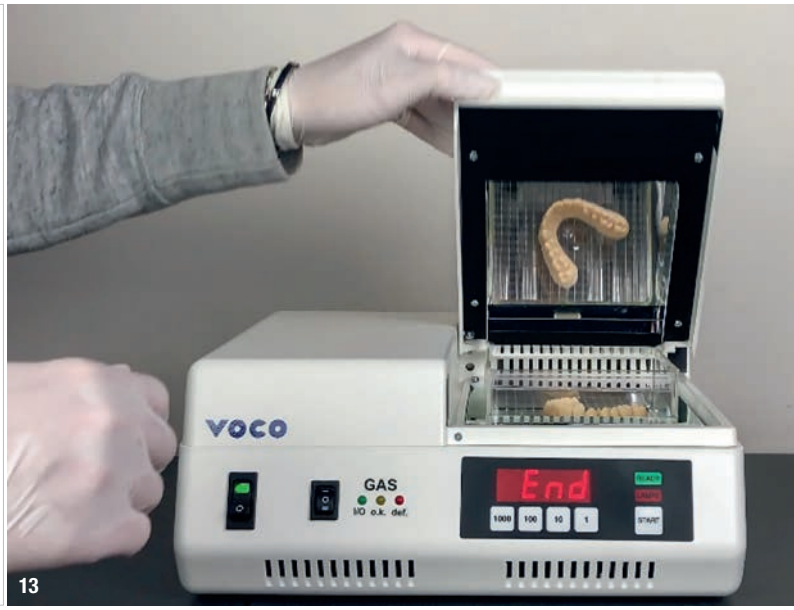

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Fig. 12: Dental model before characterisation. **Fig. 13:** Ultraviolet flashlight device for light polymerisation.

inspired by Mayan smiles. The shape of the anterior teeth was modified to meet Mayan aesthetic criteria. The incisal edges were filed, and a step applied to the central incisors. The teeth were coated with flowable composite (Admira Fusion Flow, VOCO) in Shade A3.5 for the molars, Shade A3 for the premolars, Shade A2 for the canines and Shade A1 for the incisors. Effect composite (FinalTouch, VOCO) was used to achieve a realistic reproduction. The brown composite was introduced into the grooves, and the orange into the embrasures. Inlay work was performed with green and blue composite (Twinky Star, VOCO) on the buccal surfaces of the teeth in order to simulate precious stones, and finally, the gingivae were simulated using pink composite (Amaris Gingiva, VOCO). The final result was a realistic Mayan dental arch, produced 50% digitally and 50% manually (Fig. 14).

Mayan mock-up

Reproducing a wax-up in the mouth is possible using a mock-up. To do so, we implemented two different workflows. The first workflow involved acquiring the dental arch using an intra-oral scanner (TRIOS MOVE, 3Shape; Fig. 15). The STL file was sent to a dental technician, who developed a digital wax-up. This wax-up was produced according to the criteria of Mayan aesthetics: a mesial cut on the central incisors, an incisal reduction on the lateral incisors and dental jewellery from canine to canine (Fig. 16). The digital wax-up was converted to an STL file, which was printed in 3D using a special printer (SolFlex 170 and V-Print model; Fig. 17). A silicone key was produced from the 3D-printed model (V-Posil Putty Fast and V-Posil X-Light Fast, VOCO; Fig. 18).

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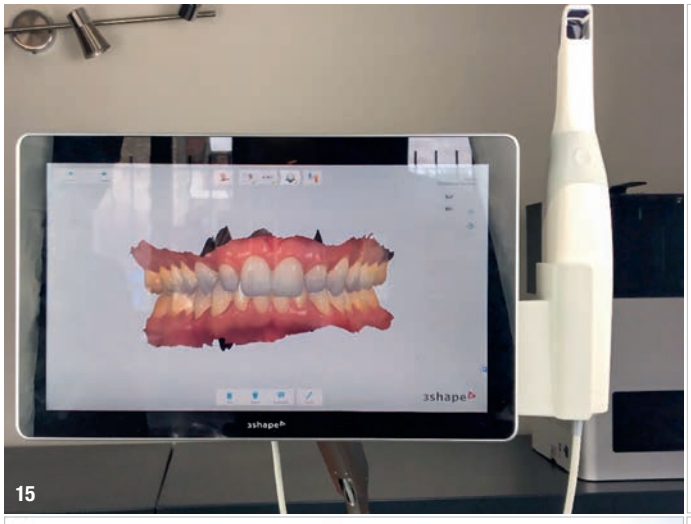
Fig. 14: Dental model after characterisation.



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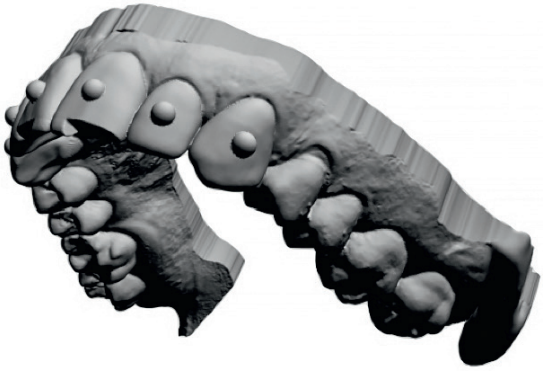

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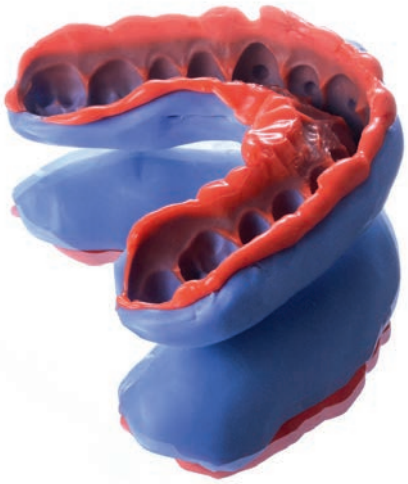

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Fig. 15: TRIOS MOVE intra-oral scanner (3Shape). **Fig. 16:** Virtual Mayan wax-up. **Fig. 17:** Mayan wax-up printed in 3D. **Fig. 18:** Silicone key.

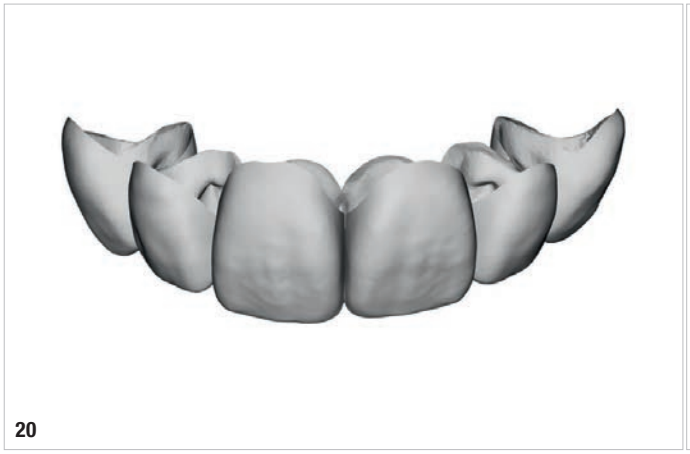
Before being inserted into the mouth, it was filled with colour composite and temporary composite (Structur 3, VOCO). As soon as the polymerisation was completed, the silicone key was removed to display the Mayan mock-up (Fig. 19). The result was astonishing, since it was simultaneously natural and supernatural. A few simple steps were sufficient to create a 1,000-year-old smile.

19

Fig. 19: Trying out the Mayan mock-up.

Mayan mock-up printed in 3D

A classic mock-up has to be destroyed to be removed. In this workflow, we used a 3D-printed Mayan mock-up. After scanning the dental arch, the STL file was sent to the dental technician, who produced the mock-up directly without making a wax-up (Fig. 20). The STL file was sent to the 3D printer (SolFlex 170), which synthesised a resin mock-up within a few minutes (V-Print model). The characterisation was achieved with colour composite: green to imitate jade and blue for turquoise (Fig. 21). The mock-up was inserted into the mouth for presentation purposes in the context of this article. (During the writing of this article, this product was not specified for intra-oral application.) The result achieved was extraordinary, both in aesthetic as well as in technical terms (Fig. 22). It proved possible



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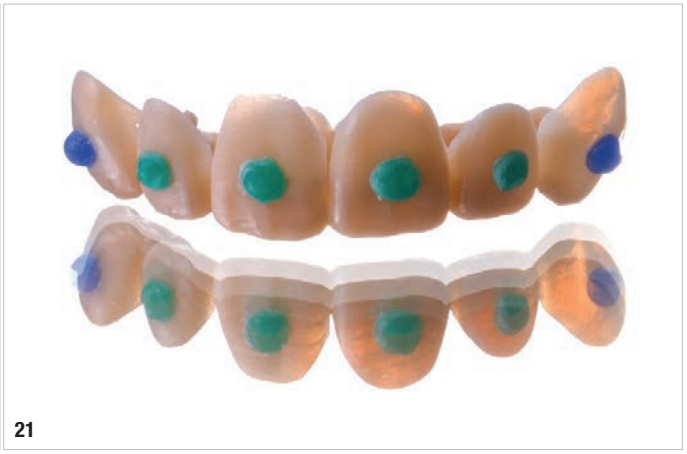

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Fig. 20: Virtual Mayan mock-up. **Fig. 21:** Mayan mock-up printed in 3D after characterisation.

by non-invasive means to produce a digitally designed Mayan mock-up from start to finish.

Clinical applications

This article presents an entertaining application of new dental technologies. Of course, there are many clinical applications. Virtual simulation of a treatment is possible from beginning to end in craniofacial orthopaedics or in maxillofacial surgery. If the patient has a Class III malocclusion or requires Le Fort osteotomy, the specialist can simulate the therapeutic result on the computer and even print out the skull of the patient after treatment. This is a great way of checking the appropriateness of the treatment plan and obtaining the support of the patient.

The dentist can also simulate treatment plans in general dentistry or even allow the patient to try out the end result. After scanning the dental arch, the dentist can simultaneously display the digital wax-up using the digital smile design on the screen. After validation by the patient, a 3D printer can be used to print out the wax-up or, even better, the mock-up. Within minutes, we obtain a specific way for the patient to check and approve the therapeutic proposal.

Conclusion

To this day, the Maya have kept their capabilities and expertise secret. In view of the longevity of their operations and their technical inventiveness, their dental aesthetic capabilities are breathtaking. Current dental technology has made it possible to design a smile with extremely demanding aesthetic criteria.

Today, many dentists are looking for ways to meet their patients' requirements. Digital dentistry provides tools that are affordable and accessible to everyone, enabling all requirements to be met. Whether in general dental practice, implant dentistry or orthodontics—digital technology has its place in everyday practice. It is up to the practitioner to find the right dental technology to compete with the Mayan dental artists.

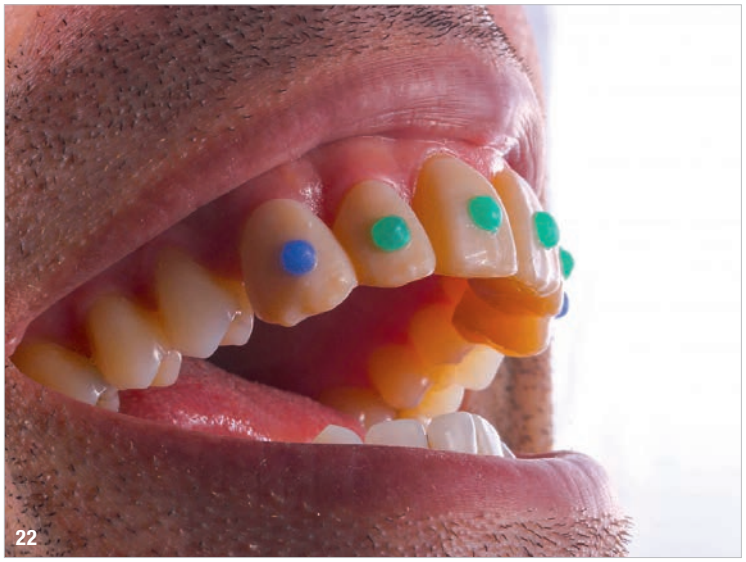

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Fig. 22: Trial of the Mayan mock-up after 3D printing.

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contact

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Bioactivity: Why should I care?

Dr Fay Goldstep, Canada

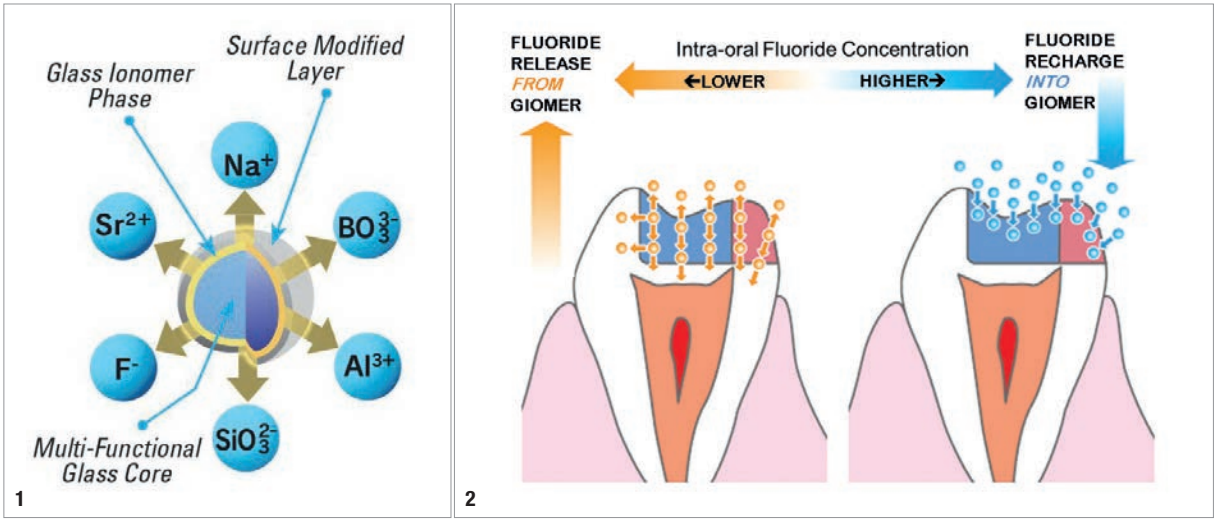


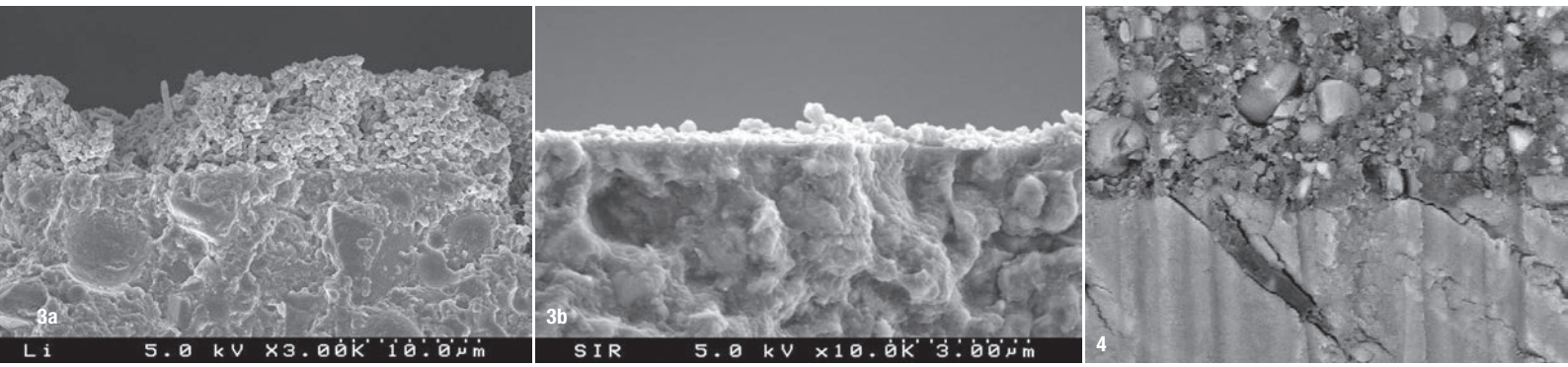
Fig. 1: Giomers are based on a proprietary filler particle with six ions that have distinct biological benefits. **Fig. 2:** Giomers act as a reservoir to release and recharge fluoride where it is needed.

Introduction

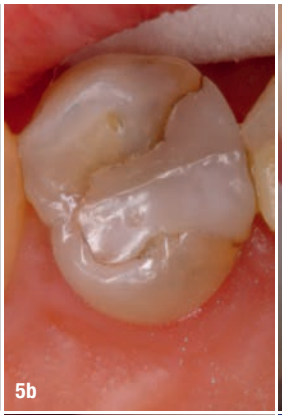
Dental clinicians are primary oral care providers focused on optimal health outcomes for their patients. The progression of oral disease is multifactorial and can present a downward spiral if left unchecked. This is not inevitable, however, if there is a conscious effort to proactively intervene, to slow or completely interrupt the process. All dental procedures must be performed with this in mind, through the practice of proactive intervention dentistry.

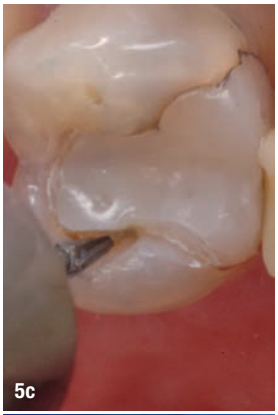
Bioactive dental materials are the ideal candidates for the restoration of form and function of dental patients' carious and/or damaged dentition using a proactive approach. Bioactivity is defined as having "any effect on, interaction with, or response from living tissue".[1] Bioactive materials are active, not passive, participants in the restorative process.[2] They provide proactive benefits for the patient that continue after they are placed, without any additional intervention on the part of the clinician.

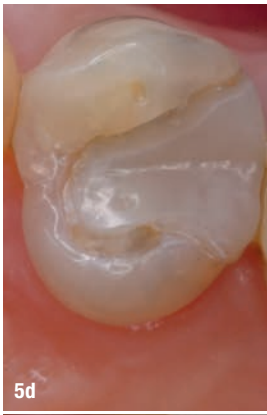
For a material to be tried and successfully incorporated into a dentist's practice, it must exhibit superior physical and aesthetic properties and be user-friendly. Dental manufacturers work hard in creating these products. Some products have superior properties or are user-friendly, whereas the best have both attributes. Effective, successful bioactive materials must provide the same superior properties, be user-friendly and, of course, add the healing aspect of bioactivity.

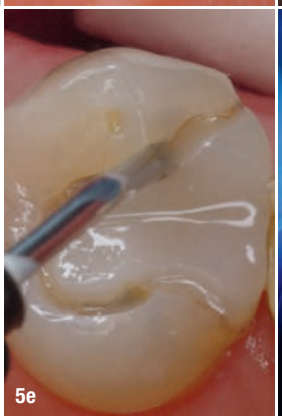


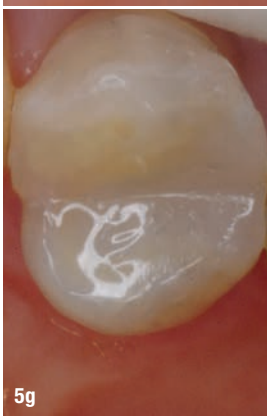
Figs. 3a & b: Giomer ion release creates a protective film layer which inhibits plaque formation. Plaque accumulation on a conventional composite placed in salivary solution **(a)**. Almost no plaque accumulation on a giomer material placed in salivary solution **(b)**. **Fig. 4:** The chemical and micromechanical (through resin tag formation) bond of FIT SA.











Figs. 5a–g: The perimeter preparation using FIT SA. FIT SA **(a)**. Stains and secondary decay around the defective margins **(b)**. Stains and secondary decay around the defective margins are removed **(c)**. Sound tooth and non-stained restoration formed the new cavity margins **(d)**. FIT SA is placed **(e)**. FIT SA is light-polymerised **(f)**. FIT SA is plaque-resistant and remineralises the surrounding tooth structure without a bonding agent barrier, thereby preventing future perimeter breakdown and staining **(g)**.

Bioactivity in dental materials can be displayed by:[2]

1. the ability to remineralise and strengthen tooth structure through fluoride release and/or release of other minerals;
2. the formation of an apatite-like layer on their surfaces when immersed in bodily fluids; and
3. the regeneration of live tissue to promote vitality in the restored tooth.

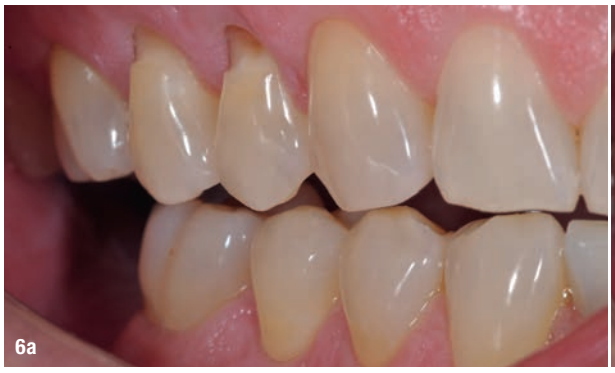
This article focuses on bioactive materials that heal by re-mineralising to strengthen remaining tooth structure and on other bioactive materials that regenerate live tissue to heal the pulp and keep the tooth alive. These are everyday restorative materials that are essential to the general dental practice.

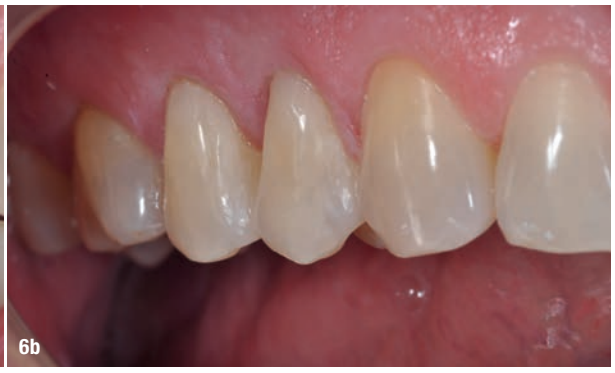
Remineralisation: The natural repair process for non-cavitated lesions

Oral saliva is a miraculous solution that bathes the dentition with minerals that keep teeth strong and resistant to acid challenges. There is a constant state of demineralisation and remineralisation occurring which fluctuates depending on food consumption, oral hygiene, oral pH and other factors unique to each individual patient. Remineralisation is the natural repair process for tooth structure before it becomes cavitated. When remineralisation outperforms demineralisation, the tooth retains its mineral content and integrity. When this balance is disrupted, demineralisation prevails, minerals are lost and, with time, cavitation occurs. Oral hygiene products and techniques may improve the initial situation, and today's restorative materials are able to bioactively tip the balance to encourage remineralisation and to accomplish this in vulnerable, previously damaged areas which now require restoration or repair.

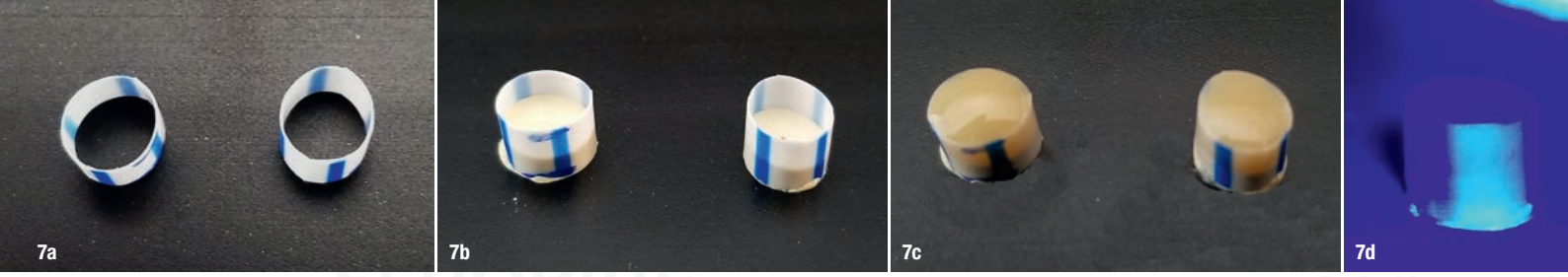
Everyday bioactive clinical dentistry

As mentioned, the ideal everyday go-to restorative material must exhibit superior physical and aesthetic properties and





Figs. 6a & b: Before **(a)** and after **(b)** images of Class V restorations using FIT SA. *(Images: © Dr Jack Griffin)*



Figs.7a–g: Counter-top experiment to verify whether Biodentine achieves total set after being sealed with composite resin within a minute after placement and whether the two materials attain an adequate bond. Two cut straws were placed on a flat surface **(a)**. Biodentine was mixed and inserted into the bottom of the straws **(b)**. Beautifil Flow Plus 03 was bonded and inserted within a minute of Biodentine placement **(c)**. Beautifil Flow Plus 03 is light-polymerised **(d)**.

easy handling. The addition of bioactive properties should in no way diminish these attributes. Giomers (SHOFU Dental) were developed to do just that: to be the everyday go-to bioactive restorative solution. This is the family of Beautifil and Beautifil Flow Plus materials.

Giomer materials have been clinically evaluated in a series of long-term clinical trials. A study of Beautifil restorations placed at the University of Florida in the US found no post-operative sensitivity, no secondary decay and no marginal deterioration, 100% retention and maintenance of anatomical form with 95% of lustre retained after eight years.[3] A 13-year recall study demonstrated that 95% of the restorations had no secondary decay.[4]

What about bioactivity? Studies show that dentine remineralisation occurs at the preparation surface adjacent to the giomer.[5] Giomers are based on a proprietary filler particle that contains ions that have distinct biological effects. These are fluoride (remineralisation, acid resistance, antibacterial), strontium (acid resistance, decreased sensitivity, antibacterial), aluminium (decreased sensitivity, radiopacity), silicate (calcification), borate (antibacterial) and sodium (radiopacity; Fig. 1). Giomers take up additional fluoride (after fluoride toothpaste, rinse or varnish applications) and then act as a reservoir until the fluoride is needed. This can be best described as a fluoride bank from which fluoride is released on demand during cariogenic challenges (to decrease demineralisation and enhance remineralisation) and then recharged during fluoride application of toothpaste, varnish, etc. (Fig. 2).[6,7]

The ion release around the giomer restoration creates a bioactive envelope (protective film layer) which inhibits bacterial adhesion and plaque formation, thereby decreasing the risk of secondary decay and promoting periodontal health (Fig. 3). The ions in the protective film layer neutralise oral acids, in effect creating an acid-free zone around the restoration. The full range of bioactive actions of giomers thereby strengthens surrounding tooth structure and increases the longevity of the restoration.

Most recently, SHOFU introduced FIT SA, a self-adhesive, flowable, bioactive giomer restorative material, thereby eliminating the bonding layer, which may be a barrier to full ion transfer between the restoration and the tooth. There is no bonding layer to block the beneficial action of giomer ions on the tooth. The bonding agent is within the material itself. This is chemical as well as micromechanical (through resin tag infiltration) bonding (Fig. 4).

FIT SA is designed to be used as a liner, in small Class I, Class III and Class V restorations, and for any other non-load-bearing indications. It is ideal in paediatric and geriatric cases, where speed and efficiency are of the essence. No etching, no rinsing, no mess. Defects and secondary decay around old crowns are speedily repaired with a material that delivers bioactive benefits for many years after placement.

Time and function may break down the margins of a restoration, at the interface between tooth structure and composite resin. In many cases, although the margin exhibits localised or perimeter breakdown and secondary decay, the rest of the restoration remains intact. The dentist is then faced with the decision of replacing or repairing the restoration. This is not the time to watch and wait until the restoration becomes unsalvageable. A perimeter preparation is a proactive treatment performed at an early stage before more extensive treatment is required. All stain and secondary decay around the defective margin must be removed. The ideal replacement material should integrate with the original restoration and the remaining tooth structure, be plaque-resistant and have remineralising properties in order to prevent future perimeter breakdown (Fig. 5).[8] FIT SA is this material.

Over the life of a restoration, the bonding layer may eventually create a stain line at the margin. With no bonding layer, no stain line will develop. This is particularly beneficial in Class III and Class V restorations (Fig. 6). The FIT SA restoration also blends easily with the surrounding dentition owing to its unique filler structure that combines the light transmission and diffusion properties of dentine and enamel.

Glass ionomers, the original bioactive materials, should be used in challenging restorative areas where it is difficult to achieve a dry field. They are also indicated as protective sealants against caries during tooth eruption and development.[9]

Bioactive regeneration of pulpal tissue: Saving tooth vitality

What is the protocol in cases of deep decay where a remineralising resin liner is just not enough to protect pulp vitality, where decay reaches dangerously close to the pulp, or even slightly into it? Biodentine (Septodont) is a calcium silicate material developed to protect the pulp and to assist in regenerating pulpal tissue, without the physical limitations and handling challenges of earlier mineral trioxide aggregate (MTA) products.

Biodentine provides a hermetic seal that protects the pulp from bacterial infiltration and provides an ideal environment for healing to take place. This seal is formed by Biodentine's micromechanical retention into the dentinal tubules as well as by its stimulation of odontoblasts to deposit dentine.[10]


After 24 hours, the straw matrices were removed, demonstrating the total set of Biodentine under the composite resin. Biodentine is shown on top and Beautifil Flow Plus 03 on the bottom **(e)**. An attempt is made to break the bond between the two materials **(f)**. The bond was maintained. A cohesive fracture occurred within the Biodentine **(g)**.

Upon mixing, Biodentine produces calcium hydroxide, a known pulp regenerating agent.[11] Calcium hydroxide on its own does not have long-term stability and with time turns into what can best be described as cottage cheese. The Biodentine formulation produces a gel-like material envelope around the calcium hydroxide that is strong and not porous. This harnesses the regenerative powers of calcium hydroxide without its physical disadvantages. Biodentine, through the action of calcium hydroxide in this enhanced physical state, boosts the deposition of reparatory dentine by odontoblasts, creating a dense dentine barrier[12,13] that allows for isolation and healing of pulpal tissue.[14]

It should be noted that non-resin-based materials (Biodentine) and ProRoot MTA (Dentsply Sirona) were more effective than a resin-based material (TheraCal, BISCO) in a partial pulpotomy study.[15] In another study, TheraCal LC was shown to increase inflammatory cells and to decrease the regenerative processes of the pulp, whereas Biodentine did not increase inflammation and supported pulpal regeneration.[16] These studies suggest caution in using resin-based materials for vital pulp therapy.[2]

Biodentine can be used as a base in deep carious lesions, as a pulp capping agent in vital pulp therapy (both direct pulp capping and pulpotomy), for root repair (perforations, resorptions, apexifications, etc.), and for anywhere pulpal regeneration and tissue healing are needed.[2]

What about handling? Biodentine has been under-used in clinical practice owing to the assertion that complete set of the material is necessary prior to finishing the restoration with composite resin. Is this because the material does not completely set under the composite resin? Is the bond inadequate between the unset Biodentine and the overlying composite resin?

Instructions recommend bulk filling of Biodentine completely and using it as a temporary restoration while evaluating pulpal response. The patient then returns in three to six months for replacement of the external layers with composite resin. A second option is to wait chairside for 12 minutes for the material to set completely before placement of the composite resin.

The experiment

The author undertook a simple counter-top experiment to test whether Biodentine would achieve total set after being sealed with composite resin within a minute after placement and whether the two materials would achieve a good bond. Biodentine was mixed and inserted into two cut straws, which were placed on a flat surface (Figs. 7a & b). BeautiBond (SHOFU Dental) was applied and light-polymerised. (A seventh generation no-etch bonding agent is preferred, as it eliminates the possibility of etching or rinsing interfering with the set or bond of the materials.) Beautifil Flow Plus 03 was then applied (Fig. 7c) and light-polymerised (Fig. 7d). The straws with the two restorative materials and bonding agent were left for 24 hours.

After 24 hours, the straw matrices were removed, and it was observed that the Biodentine had set rock-hard (Fig. 7e). An attempt was made to break the bond between the two materials (Fig. 7f). The result was a cohesive fracture (Fig. 7g) within the Biodentine (a therapeutic, regenerative material not designed to withstand shearing forces). This was not a bonding failure between the two materials.

The takeaway: there is no reason to wait 12 minutes for the complete set of Biodentine before finishing the restoration with composite resin. Biodentine sets completely underneath composite resin, and the bond between them is strong.

Conclusion

The answer to the question of why we should care about bioactivity is clear. Whether it is the everyday go-to restorative giomer, or glass ionomer for challenging locations, or calcium silicate to save pulp, bioactive materials can help stop and reverse disease. They are better for the patient. They enhance clinical outcomes. They are easy to use. The time has come for bioactive dentistry!

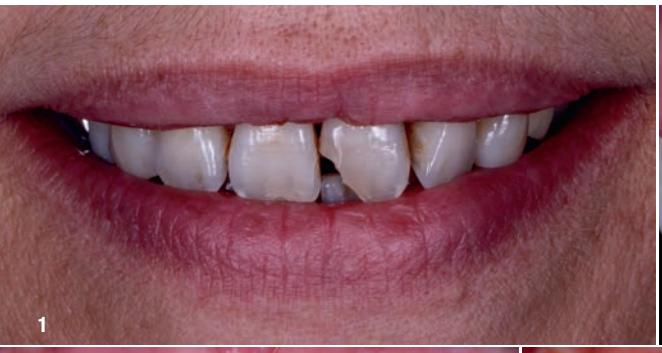
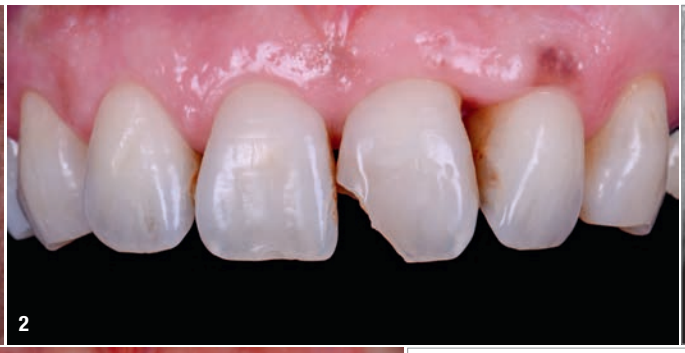
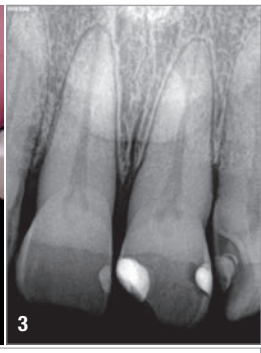
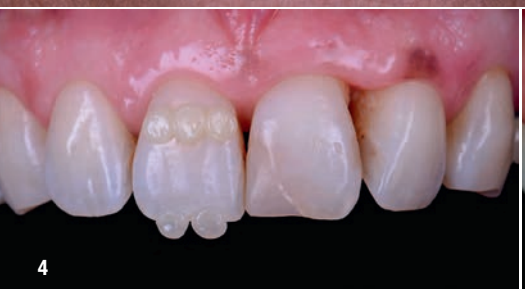
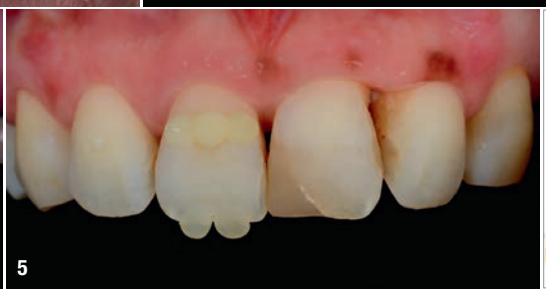
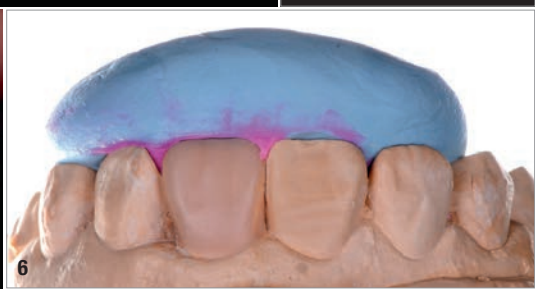
Editorial note: A list of references is available from the publisher.

about

Dr Fay Goldstep, DDS, is a clinician, author and educator. She has lectured nationally and internationally on proactive/minimal intervention dentistry, soft-tissue lasers, electronic caries detection, healing dentistry and innovations in hygiene. Dr Goldstep has been a member of the teaching staff of the postgraduate programmes in aesthetic dentistry at the State University of New York at Buffalo, the universities of Florida and Minnesota, and the University of Missouri–Kansas City in the US. She sits on several editorial boards, has contributed to four textbooks and has published more than 100 articles. She is a fellow of the American College of Dentists, International Academy for Dental-Facial Esthetics and American Society for Dental Aesthetics. Dr Goldstep is a consultant to a number of dental companies and practises in Toronto in Canada.

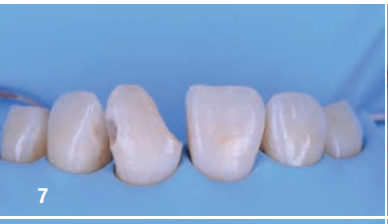
Simple chords of shades for harmonious restorations

Dr Wallid Boujemaa, France

Figs. 1 & 2: Case 1—initial situation. **Fig. 3:** Initial periapical radiograph. **Figs. 4 & 5:** Shade selection using the composite button technique, without (4) and with (5) polarising filters. **Fig. 6:** The wax-up allowing the creation of a palatal silicone key.

Composite restorations set the rhythm of the daily life of our dental practices. Whether they are the final goal of a rehabilitation or an intermediate stage of the treatment plan, their implementation must be easy and reproducible. In anterior areas, the shape, colour and occlusal condition must be rigorously studied to achieve the desired aesthetic and functional requirements. In terms of posterior teeth, direct restorations have to fulfil two major goals, biological and functional. While aesthetics are not to be left behind, respect of cusp morphology will certainly be of greater importance. For more than a decade, composite resins have been used to fulfil these specifications. Their simplicity of application, their mechanical resistance, their polishing abilities and their optical properties allow them to integrate per-





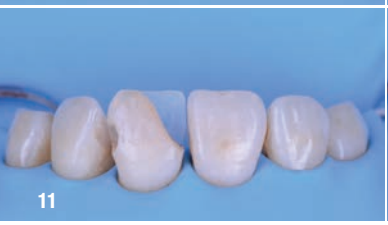
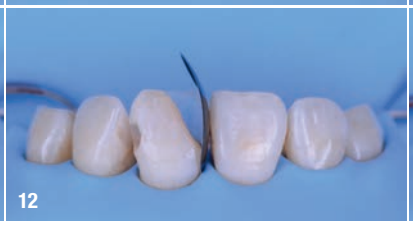
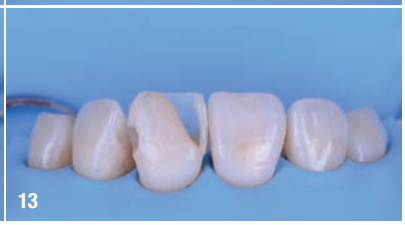





Fig. 7: Tooth isolation with a dental dam. **Fig. 8:** Enamel etching using 37% orthophosphoric acid for 10 seconds. **Fig. 9:** Application of G-Premio BOND universal adhesive (GC). **Figs. 10 & 11:** Creation of the palatal enamel shell using the Junior Enamel shade (G-ænial A'CHORD, GC). **Figs. 12 & 13:** Elaboration of the mesial surface with an enamel shade using a proximal matrix (LumiContrast, Polydentia). **Fig. 14:** Modelling of the dentine core in opaque dentine Shade A02 (G-ænial A'CHORD).

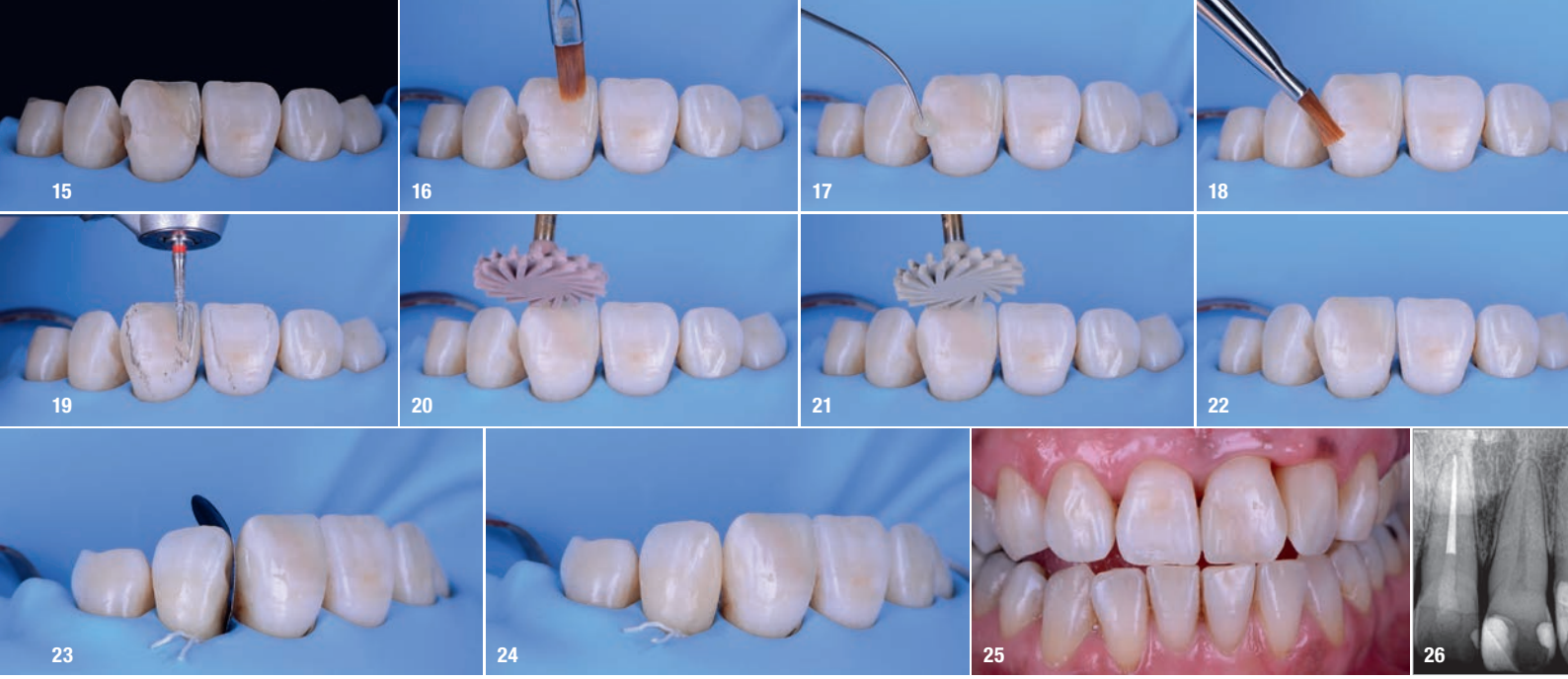


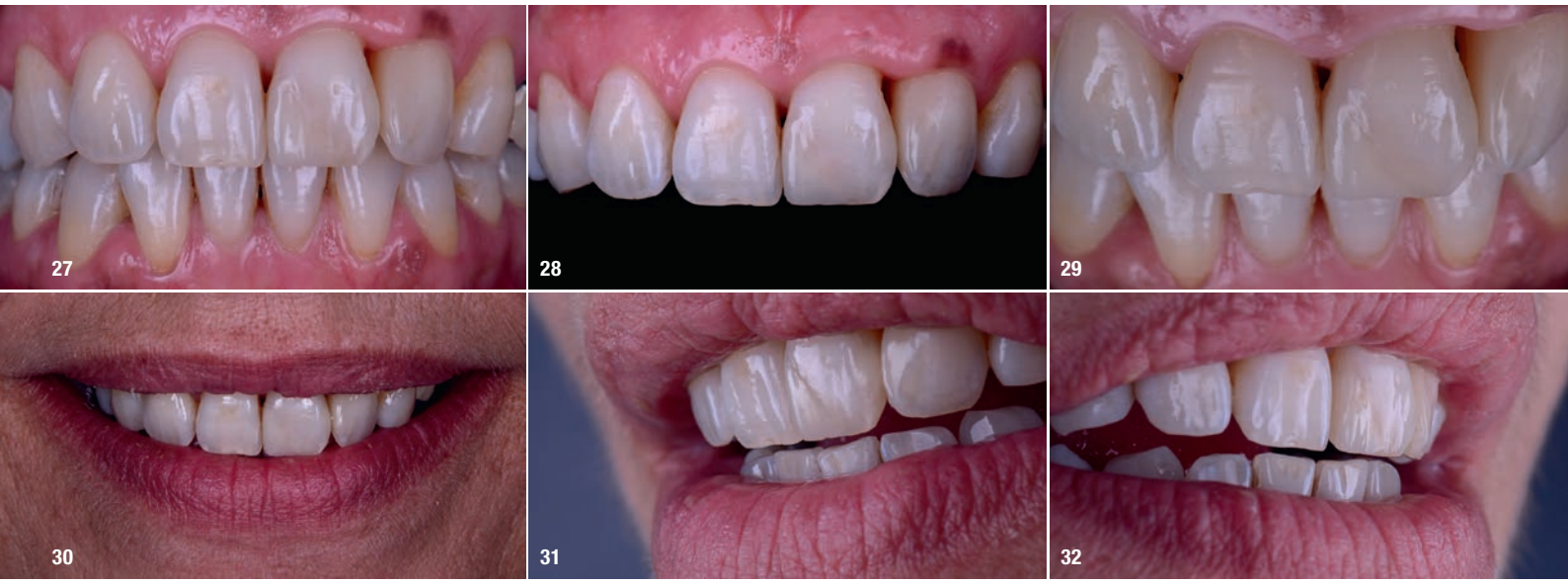
Fig. 15: Modelling of dentine mamelons using the A2 shade (G-ænial A'CHORD). **Fig. 16:** Application of superficial enamel, Shade JE. **Fig. 17:** The distal cavity is blocked with a core shade of medium opacity, A2. **Fig. 18:** Use of a brush impregnated with an unfilled resin (Modeling Liquid, GC), making it easier to sculpt and adjust the composite. **Fig. 19:** Macro-anatomy management with a red flame bur. **Fig. 20:** Pre-polishing with the pink silicone disc Diacomp TwistPlus (EVE). **Fig. 21:** Polishing with the beige silicone disc Diacomp TwistPlus (EVE). **Fig. 22:** Surface condition after finishing and polishing. **Figs. 23 & 24:** Reduction of the black triangle with a shade of medium opacity, A2. **Fig. 25:** Immediate post-op situation. **Fig. 26:** Post-op radiograph.

fectly with natural tissue over time. Among these materials, GC's G-ænial range has proved itself for ten years. Its youngest member, the G-ænial A'CHORD, has just been launched and seems as promising as the former version. With a smaller number of shades, it can cover the same situations as its predecessor, but with a markedly improved consistency and surface condition after polishing. The two cases presented here are examples of the possible applications of this material in a successful way.

Case 1: Anterior restorations using monochromatic and multi-shade techniques

A 40-year-old patient in general good health attended an emergency consultation. She had fallen on to her coffee table, causing a fracture from the mesial angle up to the middle third of tooth #21. The tooth responded positively to the pulp sensitivity test. Given the colour and textural characterisations to be reproduced, a stratification session was scheduled.

The patient also wanted to improve the aesthetics of her smile by having the apparent black triangles between tooth #21 and tooth #22 reduced. An impression for a wax-up and a provisional restoration using composite in a single-mass technique were carried out during the emergency consultation. Periodontal remediation and endodontic treatment of tooth #11, which was necrotised after the trauma, were performed prior to the composite stratification session (Figs. 1–32).



Figs. 27–32: Post-op situation at one week.

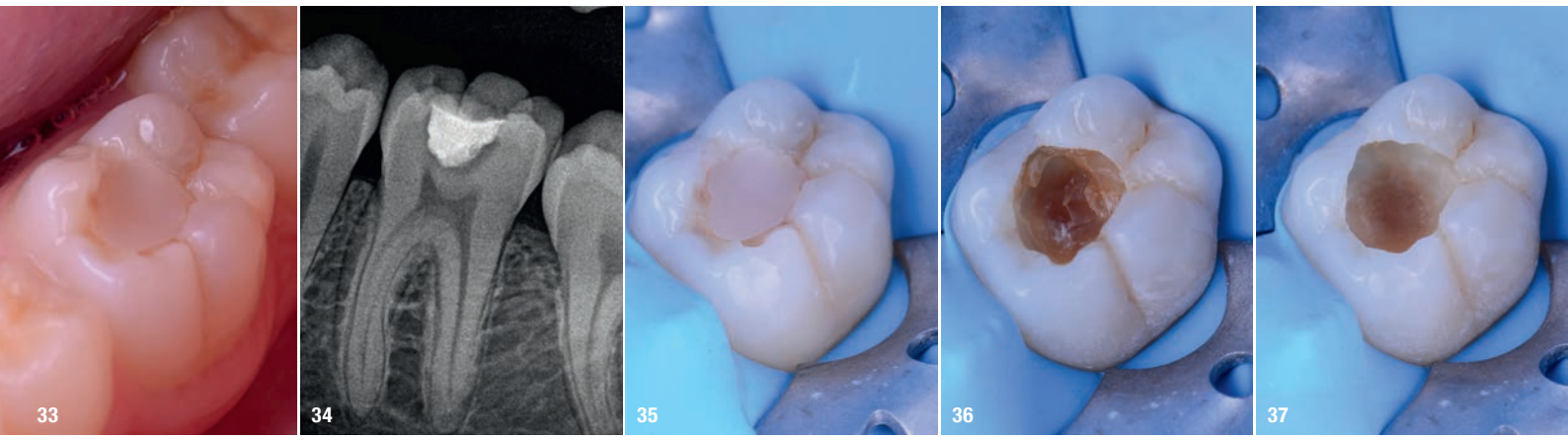


Fig. 33: Case 2—initial situation. **Fig. 34:** Pre-op periapical radiograph. **Fig. 35:** Isolation of the tooth with a dental dam. **Fig. 36:** Composite removal. **Fig. 37:** The caries removal was carried out in a centripetal way.

Case 2: Posterior restoration using a cusp-by-cusp approach

A 15-year-old patient in good general health presented herself for a check-up. She reported that tooth #36 was sensitive to sweetness. The tooth responded positively to the pulp sensitivity test and displayed an occlusal composite without morphology. Clinical and radiographic examinations revealed the presence of secondary caries under the composite, which showed

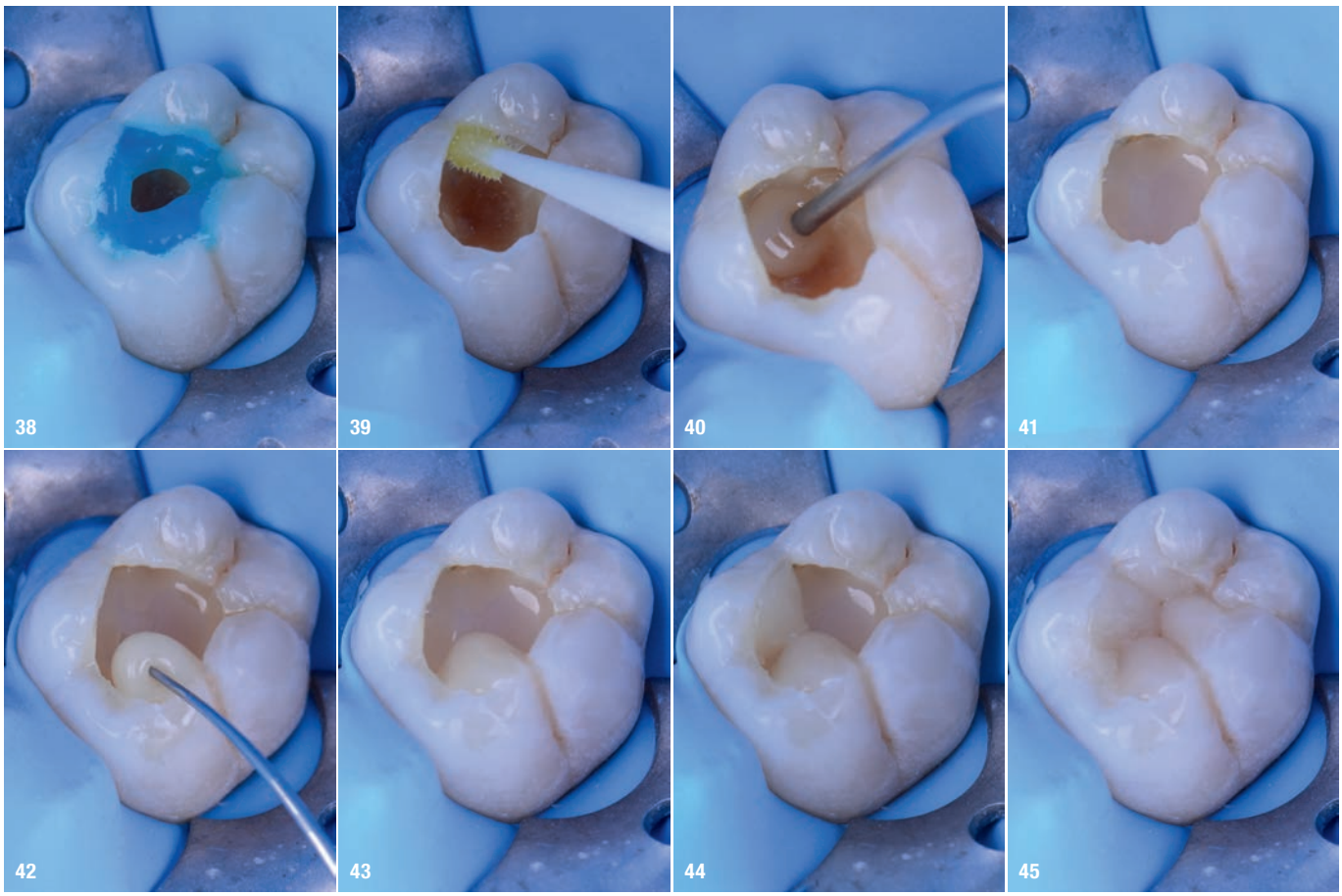


Fig. 38: Etching using 37% orthophosphoric acid for 10 seconds. This was removed with abundant rinsing. **Fig. 39:** Application of G-Premio BOND universal bonding. This was applied and rubbed vigorously on the dental surfaces and then dried thoroughly before light polymerisation. **Figs. 40 & 41:** Application of a 2 mm composite layer on the surface of the cavity using an injectable composite (G-ænial Universal Injectable A2, GC). **Figs. 42 & 43:** G-ænial A'CHORD composite A2 was easily shaped to create the cusps. **Figs. 44 & 45:** The other cusps were built cusp by cusp in the same manner, creating the occlusal anatomy.

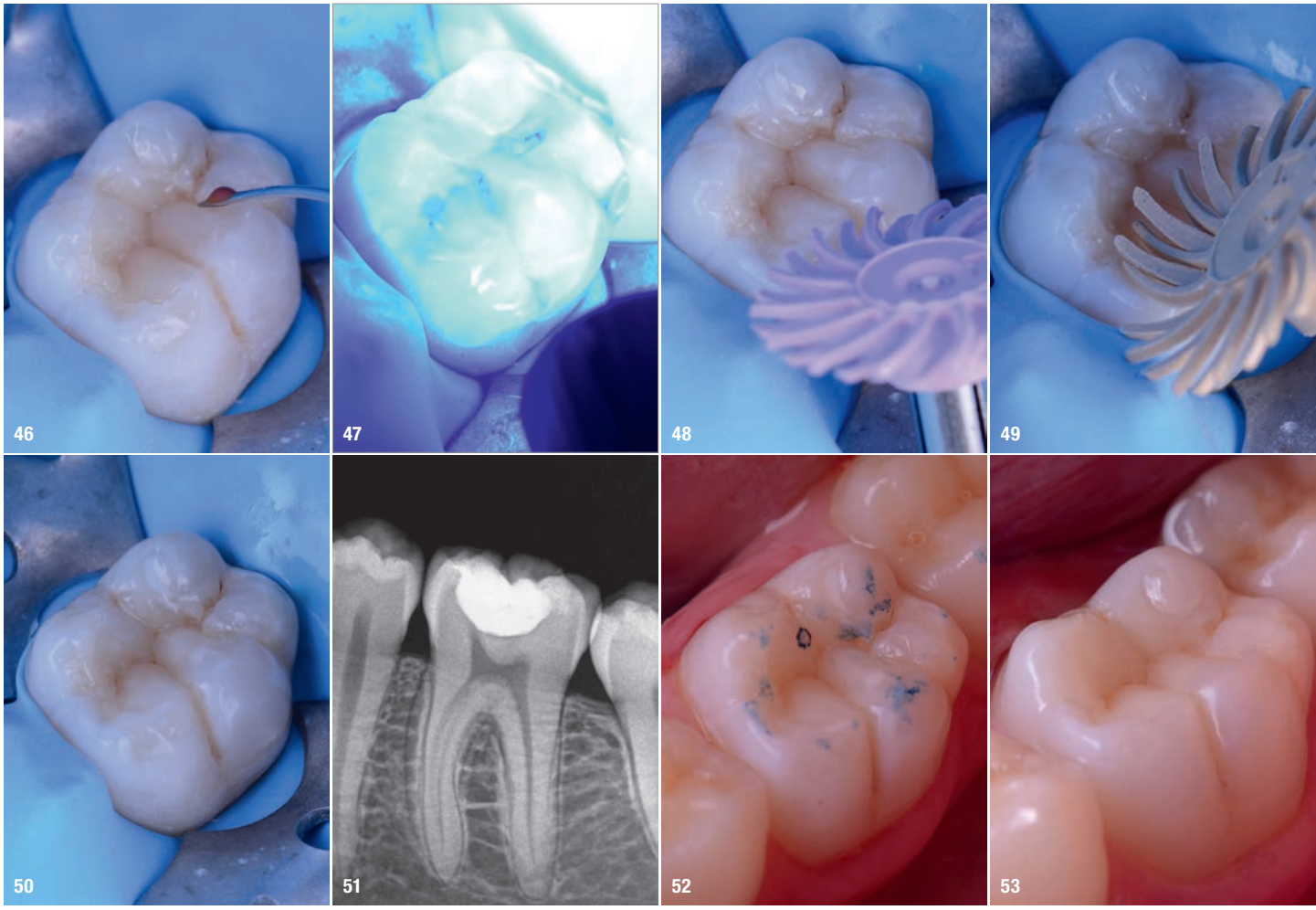


Fig. 46: The use of a composite stain (Brown Modifier, Essentia Modifier Kit, GC) makes it possible to assess the morphology and ensure that there are no gaps. **Fig. 47:** Forty-second photo-polymerization on each side under glycerin gel (AirBarrier, GC). **Figs. 48 & 49:** Polishing with silicone wheels (Sof-Lex, 3M). **Fig. 50:** Immediate post-op situation under dental dam isolation. **Fig. 51:** Post-op periapical radiograph. **Fig. 52:** Immediate post-op situation. **Fig. 53:** Post-op situation at one month. The sensitivity had been resolved.

microleakage at the margins. A session was scheduled to remove the composite and determine whether a simple renewal of the composite with a direct technique was possible. At this stage, the cavity was disinfected with a 2% chlorhexidine solution to reduce the bacterial load during caries removal, which could have led to pulp exposure.

After cleaning, the cavity was shaped. The pulpal wall appeared to be located away from the pulp chamber (0.5 mm). The thickness of the remaining walls enabled us to opt for a direct composite restoration (Figs. 33–53).

Conclusion

These two cases reflect the large scope of composite materials and the many facets with which they should be compliant. Whether used in a single-shade technique in the posterior and cervical areas or in multi-shade layering with different translucencies for more aesthetic restorations, a good composite material must raise to the main challenge: that of meeting the patient's demands effectively and in a harmonious way.

about

Dr Wallid Boujemaa graduated as a dental surgeon in 2014 from the University of Bordeaux in France. He was a university hospital assistant in restorative dentistry and endodontics between 2015 and 2019 and has since then been a lecturer at the university. He is a full-time private practitioner. Dr Boujemaa has been involved in various research projects and conferences in the field of restorative and aesthetic dentistry and won the aesthetic dentistry contest hosted by the French journal *Réalités Cliniques* and GC in 2018.

"The perfect match between simplicity and aesthetics offers the clinician several benefits"

An interview with Dr Adham Elsayed

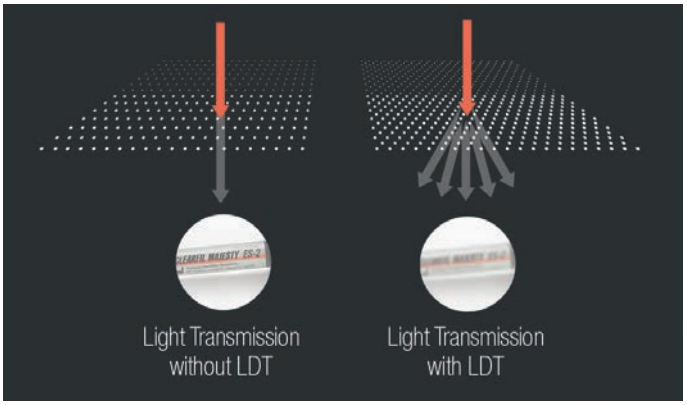
By Brendan Day, Dental Tribune International

In this interview, Dr Adham Elsayed, certified specialist in dental prosthodontics and implants and clinical and scientific manager at Kuraray Noritake Dental, details the benefits of the company's new CLEARFIL MAJESTY ES-2 Universal composite and explains its application in the daily dental workflow.

Though dentists are becoming increasingly specialised, there's a growing demand for products that can be used for all indications. How does CLEARFIL MAJESTY ES-2 Universal fit this model?

First, we need to explain the meaning of the term "universal" in this context. Previously, there have been

Dr Adham Elsayed



two types of composites that differ according to the area of application: anterior composites, used in Class III, IV and V restorations where the aesthetic outcome is the priority, and posterior composites, in which the mechanical properties like strength and wear rate are more important. Universal composites, then, are those that can be used for all types of restorations in the anterior as well as the posterior region.

Another way in which "universal" can be considered is in relation to shade. In this case, the term is used to describe a restorative composite system that exists in fewer shades, one that can adapt to the tooth structure independent of the colour of the tooth. A major benefit of this type of composites is that it offers a simplified workflow.

CLEARFIL MAJESTY ES-2 Universal is essentially universal in both meanings: it is one system that can be used for posterior and anterior restorations, and it is also provided in only three shades—one for posterior, and two for anterior.

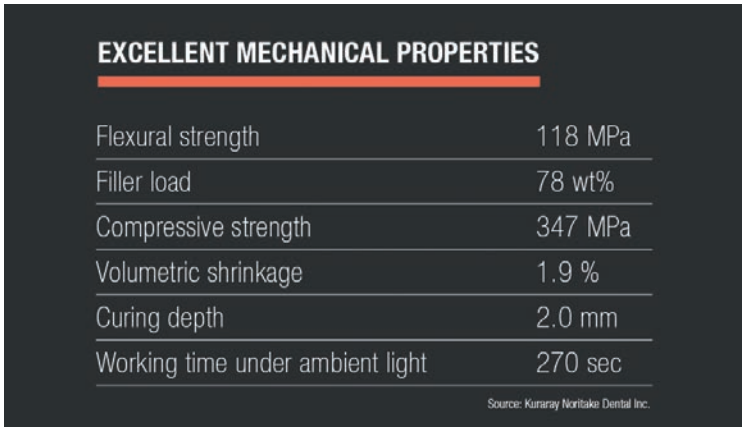
Universal products, whether they are luting cements, bonding agents or composites, are attractive to dentists as long as they offer simplification of the treatment procedure without compromising quality and durability.

How does CLEARFIL MAJESTY ES-2 Universal build upon the success of the CLEARFIL MAJESTY range?
The CLEARFIL MAJESTY family is very well established at this stage. It includes such products as CLEARFIL MAJESTY Posterior, one of the most popular posterior composites owing to its superior mechanical properties and minimal polymerisation shrinkage. CLEARFIL MAJESTY ES-2 is an extensive system that is highly beneficial thanks to its outstanding optical properties and ability to produce high-end aesthetics in the anterior region using Kuraray Noritake Dental's multilayering technique. The three flowable alternatives of CLEARFIL MAJESTY ES Flow, with different consistencies, are also other successful members of the family.

Kuraray Noritake Dental now continues the success story of CLEARFIL MAJESTY with the latest innovative product that can change the definition of the universal composite. CLEARFIL MAJESTY ES-2 Universal incorporates several attributes from the well-established ES-2 and ES Flow, including Kuraray Noritake Dental's light diffusion technology (LDT).

Speaking of LDT—how does this technology benefit the composite?
LDT allows the material to scatter and reflect light rays at many different angles, which, in turn, allows the composite restoration to diffuse light in a similar way to the surrounding tooth structure. Hence, it eliminates aesthetic problems like the visibility of restoration and preparation borders. Thanks to innovative LDT, optimal particle fillers and opacity, CLEARFIL MAJESTY ES-2 Universal blends seamlessly with the surrounding tooth structure and emulates natural teeth, eliminating the need for shade selection.

As you mentioned, CLEARFIL MAJESTY ES-2 Universal comes with one shade for posterior restorations and two for anterior restorations. Can such a reduced shade range still truly deliver aesthetic restorations?
CLEARFIL MAJESTY ES-2 Universal is not the first composite on the market with a reduced shade system. However, we can safely say that it is the first to focus on aesthetics and not just on reducing the number of shades.



We know from experience that using one-shade composite systems in the anterior region mostly leads to unsatisfying aesthetic results, even with the use of an opaquer composite to reduce shade-matching interference. This is due to the fact that trying to provide one shade for all posterior and anterior restorations, and for all tooth shades, compromises the aesthetic to a high extent. In other words, using a highly translucent material to try to match all restorations and shades will result in the interference of other objects in the mouth, such as the tongue, gingivae and so on.

> "There is no need for exact shade selection (...), and there is also a reduced amount of material stock needed."

Kuraray Noritake understood this fact well and solved the problem by introducing three shades with translucencies designed to match specific indications. It is important to note the simplicity of the workflow, since only one syringe per restoration is required. This makes CLEARFIL MAJESTY ES-2 Universal a true game-changer, as it provides the perfect match between simplicity and aesthetics.

What other advantages does this new composite deliver?

Other advantages include the superior mechanical properties for which the CLEARFIL MAJESTY family is already known, such as favourable wear properties, low shrinkage stress and high strength. It can be polished easily and retains its gloss. Moreover, the handling of the material is a huge advantage: this includes a long working time of about 270 seconds under ambient light. It is non-sticky and can be sculpted easily.

Which dental professionals would benefit most from this product?

The perfect match between simplicity and aesthetics offers the clinician several benefits. It delivers a very straightforward time-saving procedure without compromising aesthetic results. There is no need for exact shade selection, thereby excluding visible errors of non-matching shades, and there is also a reduced amount of material stock needed. Therefore, in my opinion, this should be the product of choice for most cases in everyday practice.

Advances and developments in dental materials are rapidly accelerating, and clinicians should integrate these innovations and make their daily practice more efficient with simplified workflows, time-saving procedures, fewer material selections and, accordingly, less technique sensitivity and less need for dental practice personnel to become acquainted with an abundance of materials.

Simplified posterior restoration—eliminating shade selection

Dr Piotr Marchewka, Poland

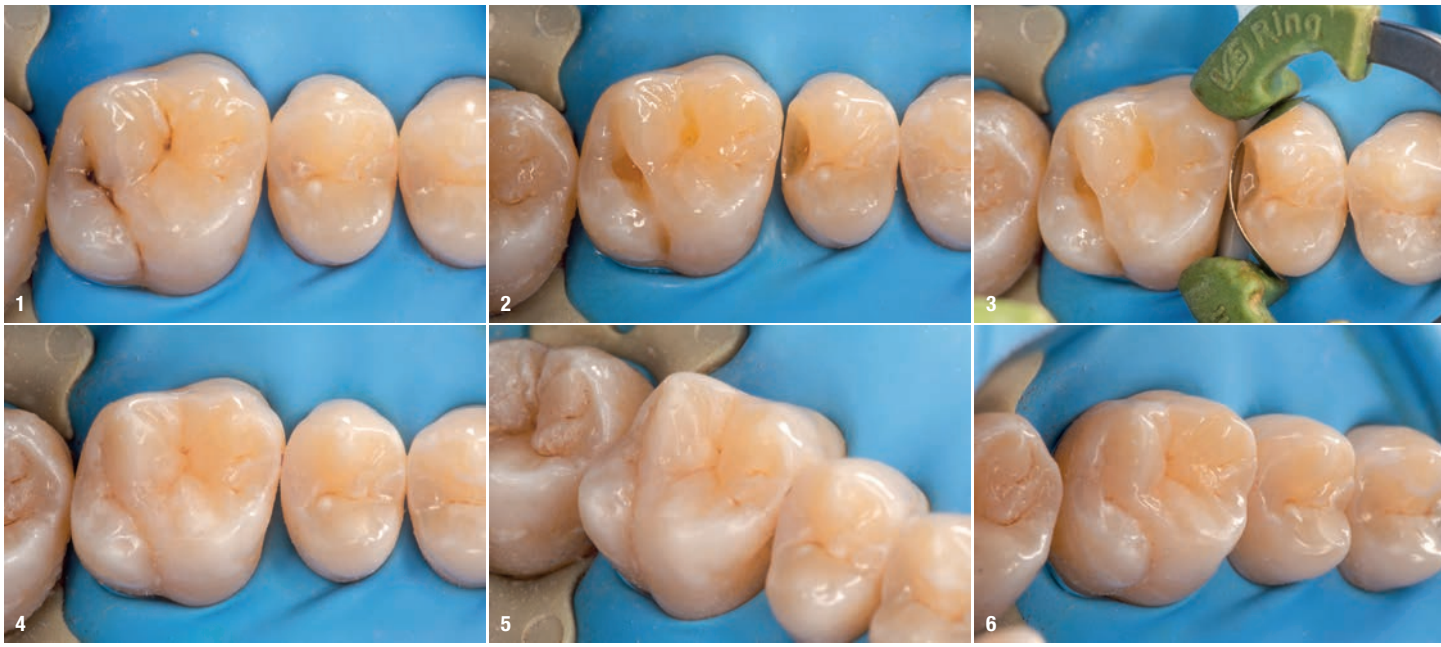


Fig. 1: Initial situation. Carious lesions were detected on the occlusal and palatal surfaces of the first molar, and on the distal aspect of the second premolar. A dental dam was placed for moisture control. **Fig. 2:** Appearance of the teeth after caries removal, selective etching of the enamel, and application of CLEARFIL SE BOND 2. **Fig. 3:** Sectional matrix in place. It is used to facilitate the creation of proper interproximal contact. **Fig. 4:** Occlusal view of the final restorations produced with CLEARFIL MAJESTY ES-2 Universal. **Fig. 5:** Mesioocclusal view of the final restorations. The surfaces were polished with Kuraray Noritake Dental polishing discs. **Fig. 6:** Distoocclusal view of the restored teeth.

Efficiency is an important factor when it comes to restoring posterior cavities with resin composite. It may be achieved by selecting a material that eliminates the need for shade selection and by the use of simplified layering techniques, for example. In the clinical case depicted in this article, a maxillary first molar and second premolar were restored with CLEARFIL MAJESTY ES-2 Universal (U) (Kuraray Noritake Dental) using the single-shade technique.

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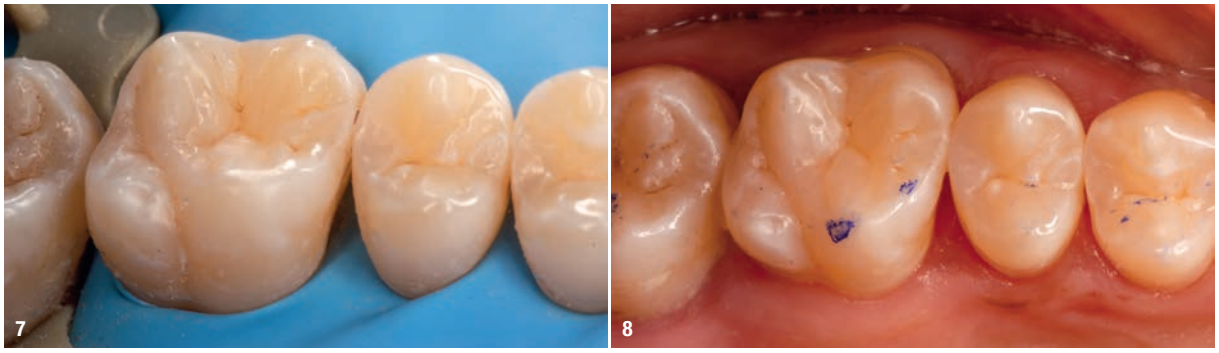

Fig. 7: Palatoocclusal view of the final restorations. **Fig. 8:** Final situation after dental dam removal and occlusal adjustments.

Sustainable dentistry is a philosophy that offers the best version of ourselves

An interview with Dr Primitivo Roig

By Monique Mehler, Dental Tribune International

For **Dr Primitivo Roig**, management and leadership skills are the best complement to good clinical practice, an added value for patients and an ally for the success of all professionals. *(All images: © Primitivo Roig)*

Dr Primitivo Roig from Spain is a dentist who combines his clinical practice with a great dedication to the dissemination of knowledge about management in dentistry and with the promotion of a vision of efficient, science-driven and ethical dental management. His main objective is to improve the quality of service provided to patients. He is also very passionate when it comes to sustainability in the dental sector. In an interview with Dental Tribune International, Roig shared his opinion on where he thinks the profession stands when it comes to practising eco-friendly dentistry.

Dr Roig, what do you think the position of dentistry is at the moment regarding eco-friendly dentistry? Is there more that needs to be done, or do you feel like a great deal has changed already?
Undoubtedly, there is a growing awareness of the need for a more sustainable and environmentally friendly approach to dentistry. The current pandemic has provided an opportunity for all of society to reflect on the way in which we live and work across all professions and settings. Dentistry has not been an exception, and increasingly more professionals have realised the importance and critical need to continue doing what we love to do—but in a different way.

In my opinion, the change is only just beginning, and there are other industries and professionals who are way ahead of us. Changing the mentality of the profession as a whole and of all its members is the first step, and this has already begun. Of course, like in other professions, there will be professionals who are less interested in this change, and it will be the job of those who are more visionary and committed to motivate and convince the rest that it is possible and very beneficial for everyone to prioritise more eco-friendly dentistry without having to sacrifice his or her professional growth, innovation and the profitability of his or her professional practice.

FDI World Dental Federation accounts sustainability as a core principle of dentistry which "must be practised ethically, with high levels of quality and safety, in the pursuit of optimal oral health". What do you think of this statement?
This is a fundamental statement. Quality of care, patient safety, and professional and people-oriented values are the

basis of excellence. In a world where the focus seems to be primarily on technology and technique, it is important to remember the fundamental pillars of dentistry and the service provided to each patient. Sometimes the glamour or attractiveness of new developments can take us away from the fundamentals. We need innovation, we need marketing, and we need technological evolution, but none of these contributions will be profitable if they are not applied to sustainable, ethical, safe and quality dentistry. In other words, no icing on the cake will add value to our profession if we neglect our core business.

What does sustainability in dentistry mean to you personally?
It means doing what I enjoy doing most in a way that is respectful not only to the environment but also to people. For me, that means taking care of the natural environment as well as the working environment of my clinic and taking care of my patients as well as my team and myself. For me, sustainable dentistry does not simply boil down to a green approach but to a whole philosophy that seeks to offer the best version of our services and ourselves over time, while also having a positive impact on everything around us.

Excellence in dentistry should not only be limited to what we do within the oral cavity, nor should it be justified at any price. Excellence should also encompass everything that happens in the clinic and the impact our work has on society. Excellence must be accessible to the patient, profitable for the professional and sustainable for the environment. If it is not accessible, we cannot provide patients with our high-quality care; if it is not profitable, we will not be able to expand our service over time or continually re-invest in improvements; and if it is not sustainable, we will punish others and, in turn, ourselves with a more toxic and harmful world and work environment.

What are the measures you have implemented in your practice that contribute to a greener future?
I would like to clarify in my answer that, for me, the green aspect is just another pillar in a different way of practising dentistry. Sustainable dentistry must be more respectful to the environment as well as to people and their physical and mental well-being.

In our clinic, we have implemented an entire philosophy and management model that includes several measures. In terms of the environment: use of recyclable and eco-friendly materials in all possible processes; reduction of plastic as much as possible; recycling of waste; elimination of paper thanks to complete digitalisation in management and communication tools; and organisation of the agenda with a slow approach that reduces patient visits to the office and therefore reduces environmental pollution and the use of resources.

And in terms of personal care: work schedules that are compatible with work–life balance; organisational charts with defined roles; individual professional development and support programmes; periodic networking and motivation sessions; thorough monitoring of patient and professional satisfaction through evaluation tools; and periodic productivity, quality and profitability analyses.

In my opinion, a professional who does not know how to take care of his or her practice, his or her team or him- or herself will hardly be able to take care of the environment. That is why, in our model, we pay special attention to making the change towards a greener dentistry by changing our way of working and our style of living.

> "[Sustainability] means doing what I enjoy doing most in a way that is respectful not only to the environment but also to people."

How would you say your colleagues are adapting to such measures? And what advice would you give a colleague who is hesitant about implementing them or to someone who is not fully convinced of the effects of climate change?
I like to think that, by now, there is no one who is not convinced of the effects of climate change. I think it is not a question of being convinced about the problem but rather about finding the solution and our role in it. There are many who know the problem and few who know the solution. This is not a problem for a few, and therefore, the solution is not reserved for the minority.

I think the main challenge lies in the fact that we, as professionals, must slow down the pace of our work and lifestyle so that we can take better control of our agendas and give ourselves the opportunity to be able to perform with much greater calmness and awareness. I like to say that we live in a very fast world, so living slower will help us to take better care of everything and everyone. Each person must know that his or her contribution, no matter how small, adds up to the common mission. I am totally convinced that there is a much brighter, much more enriching and much more beneficial way of dentistry for everyone.

Presently, there is no official body that governs what green dentistry really means. It is an optional step to take for dental professionals. Do you think there should be laws in this regard in order to enforce change?
Any organisation or project aimed at improving dentistry should always be welcomed. However, in my personal

Dr Primitivo Roig currently leads dentalDoctors, an organisation specialising in training related to clinical management and leadership. He is a guest lecturer at the Harvard School of Dental Medicine in Boston in the US and combines teaching with clinical practice at his own clinic. He is also the founder of Clínicas W, the first network of dentists and dental clinics based on the Slow Dentistry method.

opinion, I am not really convinced that green dentistry should be championed by a specific body. Although it would be a great contribution if it existed, I think that the change should rather be led by regulatory bodies, universities and institutions already in existence. Undoubtedly, I think they are the ones who should motivate the change by regulating professional practice in order to facilitate a change that is certainly necessary and beneficial.

Dentistry and dental professionals should never be a problem for anyone or anything; on the contrary, we should set an example and be part of the solution. Why then do we not pay sufficient attention to an aspect as important as the impact made by our profession? It is not easy, and one cannot always set an example, but trying to improve every day and striving to contribute increases the reward of practising dentistry.

> "For some, it is not important to do more, but to do better, and that is the best motivation to continue channelling excellence towards a much more sustainable model."

Is there anything else you can think of that I haven't covered?

We live in a fast-paced world, where multitasking, uncontrolled speed, stress, the need to be in multiple places at once and the lack of time can be considered as some of the viruses that almost no one talks about. Slowing down the pace of work in search of a greater balance where calmness and control gain ground over stress and chaos is possibly the greatest challenge we are facing and the greatest need we have in order to achieve a more sustainable dentistry.

There are many ways to refer to the model of dentistry which I call Slow Dentistry. We were global pioneers in developing a method inspired by the Slow movement and this has helped us channel excellence regarding the professional, the patient and the environment in a much more sustainable way.

The Slow movement has been in motion for many years, and dentistry is, and should be, a participant in a global movement shared with such diverse industries as fashion, gastronomy, health, education, tourism and lifestyle. For some, it is not important to do more, but to do better, and that is the best motivation to continue channelling excellence towards a much more sustainable model.

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FDI World Dental Congress 2021 will be held online

By FDI World Dental Federation

The Australian Dental Association and FDI have announced that they will present a completely virtual special edition of the World Dental Congress (WDC) from 26 to 29 September. Owing to COVID-19 travel restrictions, the congress has been moved fully online for the first time. This virtual congress, broadcast from International Convention Centre Sydney, will offer streamed live sessions as well as pre-recorded on-demand presentations. The latter will be available for 60 days after the congress.

WDC 2021 programme and exhibition

Congress participants will have more than 200 continuing education scientific sessions to choose from, and speakers will come from Africa, America, Asia, Australia, Europe, the Middle East and New Zealand. Participants will be able to interact with the speakers and ask questions in real time. The industry exhibition will be held through the same virtual event platform, ensuring a seamless experience that will enable participants to engage with exhibitors and view product demonstrations. All regular FDI business meetings and the General Assembly will also be held on this virtual platform.

"This special edition of the FDI World Dental Congress 2021 Sydney offers us a unique opportunity to showcase the value of our wide-ranging list of speakers and unparalleled continuing education offerings. Although this will be a 100% virtual event, the quality will reflect the high calibre we expect from every FDI World Dental Congress. Attendees will be able to navigate between scientific sessions and the industry exhibition with ease and connect with colleagues in real time. Because the event is no longer limited to a strict time schedule, participants will have the flexibility to attend as many sessions as they would like," the organisation stated.

Abstract submissions

The time window for abstract submission is scheduled to run for a slightly shorter period this year and will only be open until 15 April. Authors are advised to carefully review the submission guidelines (available online) and may submit abstracts for oral presentations and posters in the following categories: general dentistry; preventive dentistry; dental treatment and restorative dentistry; and oral surgery, medicine and cancer. Info: *www.world-dental-congress.org*

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How to send us your work?

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

- the complete article;
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- the author or contact information (biographical sketch, mailing address, e-mail address, etc.).

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

Text length

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

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

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

Text formatting

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

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

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

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

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

In addition, please note:

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

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

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

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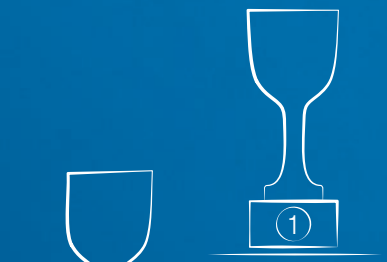

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