industry report
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opinion
Timeless trends

diary
Clinical Innovations 2012 - London
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Dear Reader,

Welcome to the first issue of Cosmetic Dentistry for 2012. I hope you find it both informative and interesting.

One of the biggest problems facing many today is finance. Nowadays, more than ever, people have to justify what they spend and how they spend it.

This has been especially relevant for cosmetic dentistry, where anecdotally some high value treatments are not being taken up by patients due to cost implications.

This is where offering patient finance could help with treatment plan acceptance. Giving patients an option whereby they can break down the cost of treatment into manageable monthly payments can boost the level of treatments being accepted.

Turn to page 30 for a closer look at offering patients options for finance.

Also in this issue is a preview for the upcoming Clinical Innovations Conference, to be held in London May 18-19. Now in its ninth year, this conference is the place to be to hear the latest thinking in the sphere of cosmetic and restorative dentistry. Go to pages 44-45 to read more about the speakers and topics to be covered at this premier event.

Hope to see you there!

Until next time...

Lisa Townshend

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Switch on to new ideas

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Dr John Moore
Dr Ajay Kakar
Ms Jackie Coventry
Dr Mona Kakar
Basil Mizrahi
Fraser McCord
Mhari Coxon
Amit Patel
Anthony Roberts
NOW Let’s Cook

BOS launches ‘brace-friendly’ recipe booklet featuring nutritional guidance

One of the activities of the 2011 National Orthodontic Week campaign was a recipe competition which encouraged people to submit their favourite brace friendly recipes. Now a collection of recipes has been compiled into a booklet featuring twenty six of the winning dishes.

Every recipe has been analysed by Juliet Reeves, who is Clinical Director of Perio-Nutrition, which offers nutritional advice specifically tailored for dental patients.

Along with the ingredients and method, each recipe features a full nutritional breakdown and advice from Juliette who also offers suggestion for ways the recipes can be altered to suit specific nutritional or oral health needs.

NOW Let’s Cook is a brightly illustrated booklet which features easy to read and following instructions for a range of starters, main courses and deserts as well as breakfast dishes and even drinks which can be prepared not only with the brace wearer in mind, but to suit the whole family, so parents don’t need to make different food and the patient does not feel singled out.

NOW Let’s Cook and the newsletter, Straight Talking, are both available from the British Orthodontic Society website – www.bos.org.uk and National Orthodontic Week website – www.nowsmile.org as free a free download. More information can be obtained by contacting Ann Wright, Administrator, British Orthodontic Society by calling 020 7353 8680 or emailing ann.wright@bos.org.uk

The ever changing tooth trend

Changes in fashion happen all the time in the fashion industry, but when it comes to ‘teeth trends’ the fashion can have a much more permanent effect.

In Japan, new tooth trends called “yaeba” in Japanese or “double tooth” gripped the fashion conscious people who were reportedly paying to have their straight teeth purposefully disarranged and made to look crooked. According to reports, the look was considered endearing and shows imperfection, making women more approachable.

Throughout the West, trends that have been popular with the fashion conscious have come in the form of tooth jewels, the famous Hollywood Smile and more recently ‘gappy smiles’, inspired by fashion icons such as Madonna, Anna Paquin and model Lara Stone. However, more recently tooth trends have taken a step away from the perfect Hollywood bright white smile and according to one report dentists are seeing a rise in request for a ‘British’ set of teeth.

Patients have reportedly been requesting for a happy medium when it comes to the appearance of their teeth, and are searching for that balance that lies somewhere between a set of crooked teeth and a noticeably perfect smile.

“The fad for filing teeth down for full veneers has gone,” Harley Street dentist Dr Simon Darfoor said in an online report. “People are looking for a halfway point, they want a more attractive smile, but with a less destructive procedure.”

Emilie Zaslow, an assistant professor of communication studies at Pace University in Manhattan, who has studied gender identity and beauty in consumer culture, noted that these ever changing trends often have one thing in common: a fixation with youth.

“The gapped tooth is sort of preorthodontic or early development, and the naturally occurring yaeba is because of delayed baby teeth, or a mouth that’s too small,” she said.
I brought my receptionist and my dental nurse with me to the eighth annual meeting of the European Society of Cosmetic Dentistry (ESCD), which was held from 30 September to 1 October 2011 in Dubrovnik, Croatia. Experience has taught me how important it is to bring team members to meetings so that they gain the same enthusiasm as the dentists and co-operate fully when new ideas from the meeting are introduced into the practice.

The meeting was presented jointly with the Croatian Dental Chamber and opened with a warm welcome from the organisers. The outstanding scientific programme included state-of-the-art lectures, workshops and live demonstrations! Prof Nasser Barghi from the US is a well-known master of cosmetic dentistry. His lecture concentrated on the reliable and correct use of porcelain, from preparation to cementation. He compared various porcelains, pointing out their advantages and limitations, and shared numerous tips to help general practitioners produce the very best results with this material.

The extended uses of porcelain were explored further by Dr Davor Seifert from Croatia, who explained how in selected cases porcelain can replace composite in minimally invasive dentistry, providing a better cosmetic and more durable result, in his view. His lec-

**Author** Dr Philip Lewis

---

**Fig. 1** Dubrovnik, Croatia.

**Fig. 2** Dr Hrvoje Pezo, President of the Croatian Dental Chamber, and Dr Wolfgang Richter, President of the ESCD.

**Fig. 3** From left to right: Dr Gregory Brambilla (General Secretary and Certified ESCD Member), Dr Florin Lazarescu (Country Chairman ESCD Romania), Dr Wolfgang Richter (ESCD President), Dr Daniel Baketic (Country Chairman ESCD Croatia) and Igor Ristic (Country Chairman ESCD Serbia).
Dr Bob Khanna from the UK looked at the place of facial aesthetic treatments using botulinum toxin and dermal fillers as part of comprehensive cosmetic care. He described therapeutic treatments like treatment of the gummy smile and masseteric hyperplasia. He stressed the importance of a thorough knowledge of anatomy when carrying out these treatments and left delegates with an appreciation of how everybody’s wish to look their best can be satisfied by combined treatments.

Dr James Goolnik from the UK discussed Internet marketing. While we may all be familiar with Facebook and LinkedIn, dentists need to recognise the opportunities for promoting their practices using these new technologies. Smartphones and YouTube also allow us to promote our message in ways not even available a few years ago and Goolnik explained how to get the most out of these possibilities.

Friday’s session ended with Prof Gerwin Arnetzl from Austria speaking on CAD/CAM and illustrating his lecture with a live demonstration. Saturday’s programme was equally varied and opened with a live video link showing the placement of four implants in the edentulous jaw with immediate loading. Presented by Prof Pavel Kobler and Dubravko Jurisic from Croatia, the demonstration fascinated both those clinicians already placing implants and those who plan to do so.

Periodontist Dr Alain Romanos from Lebanon spoke on the prevention and treatment of recession in the aesthetic zone. Comparing the use of the AlloDerm implant (BioHorizons) to the more traditional connective tissue graft, he explained case selection, advantages, limitations, techniques and the range of uses of this microsurgical technique.

Dr Marco Martignoni from Italy looked at the restoration of the endodontically treated tooth. Stressing the importance of excellent endodontics as a starting point he went on to consider the use of fibre posts and various types of cement. Dr James Russell and dental technician Luke Barnett carried on the theme of minimal intervention using ceramics, and Profs Martin Jörgens and Marcel Wainwright from Düsseldorf looked at the latest in modern cosmetic dentistry from the use of lasers to ultrasonic surgery.

Drs Tif Qureshi and Lennart Jabobsen from the UK gave a two-part presentation on the concept of ABB — alignment, bleaching, bonding. With the use of the innovative Inman Aligner, the lecturers explained how simple, rapid tooth movement can be achieved in the aesthetic zone, allowing further treatment to be truly minimally invasive. Bleaching the teeth towards the end of alignment improves patient motivation. Any remaining edge defects or enamel problems can be corrected by bonding with the use of composite resin.

As an alternative to the afternoon lectures, delegates had the opportunity to attend workshops, at which Dr Romanos expanded on in his lecture on recession, Prof Barghi showed clinicians how to produce impressive com-
posite veneers with a simple technique and Dr Khanna gave a live demonstration on the use of dermal fillers. Other highlights of the scientific meeting included the judging of the poster session, where once again very high standards were achieved, and the presentation of certification to an ESCD member, who had successfully submitted case reports and passed the oral examination required by the society.

Throughout the meeting, delegates could visit the excellent trade exhibition in the foyers, where a variety of products and services for the modern cosmetic practice were available.

_All work and no play?

Certainly not! ESCD meetings are well known for their social events and this year was no exception. From the ESCD and Friends' Party to the President's Party in a leading Dubrovnik restaurant, delegates had plenty of time to enjoy themselves to the full—with the more energetic partying on until late into the night!

How much do members enjoy these meetings? Well, to give you an idea, one member from France broke away from his honeymoon to bring his beautiful new wife to the event! ESCD meetings really are very good indeed. The standard of education is excellent, with worldclass lecturers regularly presenting. There is time to meet up with old friends and make many new ones. The discussions that go on outside the lecture halls can be as valuable as the lectures themselves as delegates from around the world share ideas that improve their practices. ESCD meetings are also very good value. The society tries to keep rates to a minimum to encourage all practitioners with a love of this area of dentistry to attend. Everyone attending an ESCD meeting for the first time typically can't wait for the next one! The next meeting really will be special! To be held in the Romanian capital Bucharest from 17 to 19 May 2012, the scientific meeting will be the best value yet. Why? Because it is FREE!

Thanks to the cooperation of the ESCD and the Romanian SSER, funds were raised from the EU and there will be no charge for the three-day tuition. Delegates will pay only for travel, accommodation, food and the social events. This offer is only open to ESCD members, so if you would like to benefit from it, join the society now by visiting www.escdonline.eu. The annual membership fee of only €190 for dentists and less for team members is very affordable. The offer of the free meeting is strictly limited so you must act quickly if you want to attend.

Personally, I can’t wait and hope to see you there!

Contact

ESCD Head Office
Via Gilera 12
Arcore
Italy
info@escd.info
www.escdonline.com
Simple and efficient **crown fabrication with an advanced CAD/CAM system**

**Author:** Dr Brian Buehler

---

**Fig. 1.** The patient presents after undergoing endodontic treatment one week earlier.

**Fig. 2.** Temporary material remains on tooth #13. Additionally, decay and tobacco stains are noted on the adjacent teeth.

**Fig. 3 & 4.** Tooth #13 after preparation.

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Today’s computer-aided design and manufacture (CAD/CAM) technologies contribute greatly to restorative dentistry and provide clinicians with advanced treatment options for various indications, including inlays, onlays, fixed partial dentures and full dentures, thin veneers and crowns. These systems also allow use of many restorative materials, including metal, metal-ceramic, composite and all-ceramic, to best meet the needs of the case and patient. Further, CAD/CAM systems are available for both chairside and laboratory applications, so dentists now have the ability to create highly aesthetic and strong restorations in office.

Unlike earlier generations of in-office systems that presented clinical challenges, today’s technology and materials are cost effective and efficient. Past systems lacked advanced software to control the tool path accurately and design a restoration, and inadequate scanning technology made it difficult to detect the delicate margins created during tooth preparation. The lack of advanced material sciences also contributed to a number of clinical challenges experienced with early CAD/CAM technology, and dentists struggled to properly seat CAD/CAM-processed restorations. To address the clinical challenges experienced with early CAD/CAM technology, manufacturers have developed systems that offer many advantages, including greater cost effectiveness, simplicity and efficiency.

**The CEREC system**

Amongst this new generation of CAD/CAM systems is CEREC (Sirona), which was developed to address many concerns dental professionals had regarding the set-up of conventional CAD/CAM software and machines. The milling chamber is now separated from the image capture and design hardware, allowing dental professionals to simultaneously design one restoration while milling another. With significantly higher speeds and greater memory, CEREC 3-D design software allows users to view tooth designs as they would if evaluating traditional stone models.

Today’s CEREC system includes a light-emitting diode (LED) camera (CEREC Bluecam, Sirona) for greater accuracy and higher quality images than previous infrared-emitting camera systems, and the recent addition of CEREC Connect (Sirona) allows impression and restoration information to be digitally acquired and transmitted over the Internet to dental laboratories. Laboratories can then fabricate restorations using the CEREC inLab System.
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The CEREC MC XL system (Sirona) is a powerful and accurate low-noise chairside CAD/CAM milling system that offers simplicity and efficiency for processing single-tooth restorations in six minutes and quadrant restorations in three to four minutes in a single appointment.\textsuperscript{5–7} The CEREC MC XL demonstrates precision and accuracy within the range of +/- 25 μ, and the 7.5 μ milling resolution creates restorations with improved fit and smoother surfaces.\textsuperscript{5–7}\ Additional features include automatic software downloads, simple display guides and network connectivity, and the milling chamber design enables easy block clamping without tools.\textsuperscript{5–7}

\_Material considerations

To address CAD/CAM material concerns, manufacturers have developed new ceramic materials that provide improved strength and aesthetics.\textsuperscript{5} These newer ceramics withstand CAD/CAM processing without chipping or fracturing and can be brought to full contour during milling to improve fit and function.\textsuperscript{5} Dentists can choose adhesive bonding or conventional cementation when seating these restorations, which ensures that case requirements are met.\textsuperscript{5} Improvements to cementation and adhesive systems have also enabled dentists to provide a strong bond between the restoration and underlying tooth substrates.\textsuperscript{1,4}

\_IPS e.max CAD

Composed of 70 per cent by volume needle-like crystals in a glassy matrix, lithium disilicate glass-ceramic (IPS e.max, Ivoclar Vivadent) offers many improvements to previous generations of ceramic materials.\textsuperscript{8} Available in a pressable format (IPS e.max Press) or for CAD processing (IPS e.max CAD), the material demonstrates strength values between 360 (Press) and 400 MPa (CAD).\textsuperscript{8} IPS e.max also demonstrates lifelike optical qualities that enable dentists to create highly aesthetic and naturally appearing restorations in a variety of cases.\textsuperscript{8} The versatile material is indicated for anterior and posterior restorations, including thin veneers (0.3mm), minimally invasive inlays and onlays, partial crowns and crowns, implant superstructures, three-unit anterior/premolar bridges (press only), and three-unit bridges (zirconium-oxide supported IPS e.max CAD only).\textsuperscript{8}

\_Case presentation

A 53-year-old male patient presented after undergoing recent endodontic treatment on tooth #13 (Fig. 1) and was unhappy with the tooth’s appearance. Along with decay on the adjacent dentition, tobacco stains were also present because the patient was a smoker (Fig. 2). Although the patient requested that treatment be confined to only tooth #13, after a routine head, neck and oral cavity examination, the patient was informed of multiple treatment needs and advised that a comprehensive treatment plan should be started as soon as possible.

\_Treatment plan

The patient brought to the office the endodontic report from his other clinician, advising that a good prognosis was expected from his endodontic treatment. Although the report did not detail the possible need for crown lengthening or gingivectomy procedures, these were areas of diagnostic concern in this case. However, biological width encroachment did not appear to be an issue during cleaning and probing.

To address the patient’s concern with the aest-
thetic appearance of tooth #13, high-translucency and high-strength, lithium disilicate glass-ceramic would be CAD/CAM processed into a crown. Milled to as thin as 300μm axially, the lithium disilicate crown would instil a contact lens effect on the gingival-facial margin of tooth #13.

The crown would then be bonded in place with an adhesive that demonstrates high radiopacity to ensure that excess cement was not inadvertently left behind, specifically in the deep distal margin in this case. The adhesive bonding agent also ensured that cementation was predictable. When complete, the tooth would appear natural and indistinguishable from the surrounding dentition.

Clinical protocol

After thorough examination and prophylaxis, tooth #13 was prepared for restoration with a CAD/CAM (CEREC MC XL) processed lithium disilicate crown (IPS e.max CAD) and the temporary material removed. A specialised mouthpiece (Isolite, Isolite Systems) was placed intra-orally to ensure total isolation was achieved (Figs. 3 & 4).

Prior to scanning, the tooth #13 preparation, the surrounding dentition and the soft tissues were sprayed with a CAD/CAM powder (Fig. 5). The anatomical form of the dentition and soft tissues was then captured using an LED scanning unit (CEREC Bluecam). After scanning, 3-D software (CEREC 3D) was used to design the desired crown contours and occlusal relationships.

A prefabricated high translucency lithium disilicate block (IPS e.max CAD) was then milled chairside (CEREC MC XL) into a crown for tooth #13 (Fig. 6). Lithium disilicate was the material of choice in this case because it demonstrates high strength and life-like optical properties.

The crown was tried in the patient’s mouth over the tooth #13 preparation to evaluate fit, contour and anatomical harmony (Figs. 7 & 8). Upon confirmation of proper fit and function, the crown was removed, cleaned and dried. Stains were then placed on the crown surface to mimic the tobacco stains

Fig. 11. The crown is seated on the preparation of tooth #13.

Fig. 12. Initially, excess cement is removed from the cervical and interproximal areas with a micro-brush.

Fig. 13. Pressure is applied with dental forceps to ensure that the crown remains in proper position after initial excess cement removal.

Fig. 14. Applying pressure to the crown, excess cement is removed from the interproximal spaces with dental floss.

Fig. 15. The crown is cured on the buccal, lingual and distal surfaces with the bluephase LED curing light.

Fig. 16. Dental floss is used to remove any remaining cement from the interproximal spaces.

Fig. 17. The final restorative result.
on the surrounding dentition. However, it was decided that cervical stains to mimic the decay on the natural dentition would not be placed. After staining, the lithium disilicate crown was crystallised and ready for immediate seating (Fig. 9). The specialised mouthpiece (Isolite) was repositioned in the mouth to isolate the tooth during cementation.

Dual-curing luting composite (Multilink Automix, Ivoclar Vivadent) was used to seat the crown. Indicated for use with metal, all-ceramic, metalceramic and composite restorations, the luting composite offers a strong hold on all surfaces and is available in transparent, yellow or opaque shades to ensure proper aesthetics are achieved. Additionally, the cement does not need to be protected from ambient light during mixing and placement.

Prior to application, the primer liquids (Multilink A/B) were mixed in a 1:1 ratio. A micro-brush was used to apply and lightly scrub the primer mix on the preparation enamel and dentine for 15 seconds. The priming agent was allowed to set on the enamel and dentine for 30 seconds, after which time air was used to evaporate the primer solvents. Because the primer is self-curing, light-curing was unnecessary.

The luting composite (Multilink Automix) was extruded from the mixing tip and placed directly on the inner surfaces of the lithium disilicate crown (Fig. 10). The luting composite was placed carefully to ensure that all internal surfaces were fully covered. The lithium disilicate crown was then seated on tooth #13 and slight pressure applied (Fig. 11).

A micro-brush was utilised initially to remove excess cement from the interproximal spaces and cervical areas of the crown (Fig. 12). Further pressure was applied with dental forceps to ensure the crown remained seated in the proper position during initial clean-up (Fig. 13). While still applying pressure to the seated crown, excess cement between the interproximal areas of the crown and surrounding dentition was removed with dental floss (Fig. 14). After flossing, the crown was cured with an LED curing light (bluephase G2, Ivoclar Vivadent) on the buccal, mesial, lingual and distal surfaces (Fig. 15). The interproximal spaces were then flossed to ensure that all excess cement had been removed (Fig. 16).

Upon completion of the case, the CAD/CAM processed lithium disilicate glass-ceramic crown cemented with the dual-curing luting composite demonstrated excellent fit, function and strength (Figs. 17–20). Additionally, a post-operative radiograph confirmed that all excess cement had been removed and excellent internal/marginal adaptation achieved (Fig. 21).

The patient was very pleased with the aesthetics of the crown, which appeared natural and indistinguishable from the surrounding dentition. Further, the patient was pleased that he did not have to return for another appointment because the chairside CAD/CAM system allowed the restoration to be scanned, designed, milled and seated in a single appointment.

**Conclusion**

I use the CEREC CAD/CAM system almost exclusively in my practice because patients appreciate the quality, immediacy and not having to return for additional appointments. Restorations milled with CEREC demonstrate the form and fit required for restoring even the most challenging cases. Patients also enjoy the high aesthetics and strength of lithium disilicate glass-ceramic IPS e.max that has been milled with CEREC.

Editorial note: A complete list of references is available from the publisher.
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Dr Matthew Holyoak describes a quick, cost-effective and minimally invasive treatment, using Heraeus Venus composite restorative, to improve a patient’s smile for a new career where appearances matter.

A 20-year-old female presented requesting an improved smile with which to start her new career as a beautician. She told Dr Holyoak she wanted “Brighter teeth that show more when I smile”. The patient had already considered and ruled out maxillofacial surgery and fixed appliance therapy when younger. She was looking for a quick and effective solution.

Basic periodontal screening showed inadequate gingival health, with several fast bleeding sites in the upper and lower arches. There was a lot of reformed calculus, lingually in the lower teeth as well as on the buccal surfaces of the upper molars. Tooth mobility was physiological and there was no evidence of bruxing. Bitewing radiographs showed no interproximal caries and normal horizontal bone levels.

More significantly, the initial examination revealed an anterior open bite and less than ideal width-length ratios. According to Dr Holyoak, “The central incisors had a ratio of 8.8mm/10.5mm (83 per cent), which is at the boundary of the acceptable proportions (75-85 per cent). The anterior occlusal plane was slanted and the embrasures needed improving. Increasing the length of the upper centrals would improve the proportions and give the patient a more balanced smile”.

Aesthetic Assessment Criteria:
- Anterior tooth display at rest
- Midline & cant
- Width: length ratio centrals
- Dominance
- Buccal corridor
- Anterior occlusal plane
- Lip line
- Embrasures
- Tooth form
- Gingival heights & zeniths
- Axial inclination
An oral hygiene session removed the root surface debris, and more effective brushing technique restored the patient’s oral health. One week later, there was a big improvement in gingival condition, with a greatly reduced bleeding index.

The restorative options considered with the patient included: i) no treatment, ii) indirect restorations and iii) bleaching followed by direct composite restorations. The goal was to restore balanced, natural-looking central incisors and increase tooth display. The treatment would also correct the slanted anterior occlusal plane and improve the embrasure pattern, to reduce the aggressive harsh appearance of upper canines.

Dr Holyoak recommended the following treatment plan: Tray bleaching and direct freehand composite build-up with no preparation of the existing teeth (upper 3-3, and lower 3-3).

The bleaching system recommended is, in Matthew’s opinion, more predictable than powerbleaching. The method uses 10 per cent carbamide peroxide and opalescence gel over two weeks. The trays were fabricated without reservoirs.

According to Dr Holyoak: “A minimally invasive treatment was chosen because the non-preparation technique is very low risk and no local anaesthetic is required. In this case I preferred freehand assessment and clinical judgement, rather than a 3D wax up, using silicon indexes to guide the build up.”

There was a two-week delay prior to commencement of the adhesive bonding procedures, with direct freehand build using SB1 Heraeus Venus enamel. Matthew explains: “Venus composite was used for the restorations, because of the material’s handling characteristics and shade selection. It has chameleon-like qualities of simple build up, rather than complex stratification which I felt was not required in this case”. The teeth were prepared using 38 per cent acid-etch prior to bonding. A rubber dam was used to isolate the areas to be treated, prevent contamination with moisture and protect the patient’s airway.

Restorations placed included incisally upper-right 12, upper left 12 and incisally lower 2-2. Mesial-incisal restorations were added to upper right 3 and upper left 3. The composite restorative shades were selected by Dr Holyoak to match the post-bleaching result. Pre-bleaching, the shades were A2 upper 2-2 and A3 canines. After bleaching the shades were B1 or brighter.

Dr Holyoak describes how: “The anterior tooth display and tooth form were improved, the uneven incisal edges were removed and the upper canines were made less aggressive. The dominance of the central incisors was re-established and the slanted anterior occlusal plane was corrected. The different upper anterior gingival levels were acceptable because of the low lip line. The midline, cant and axial inclinations were not issues in this case”.

The treatment was undertaken mainly during two appointments: 90 minutes for the upper 3-3, with a review next day to refine, and a 30 minute
appointment for direct restoration of the incisal edges of the lower 2-2 with Venus SB1. Polishing and a final review were undertaken one week later. The bleeding indexes were zero and the periodontal [probing depths] were normal.

This patient now has a job where she feels appearance is very important. Matthew Holyoak concludes: “It was immediately clear from the way she smiled that she was pleased with the results. She said her confidence had been boosted by the restorative treatment and she was more comfortable dealing with her own customers wanting beauty therapy”.

Reflecting on the case, Dr Holyoak feels, “it was a cost-effective solution, which was biologically minimally invasive. It avoided an expensive treatment cycle, so often involved in indirect restorations, especially important in such a ‘young’ patient.” One year later there was no incidence of debonding or chipping to the minimally restored incisal edges. New bleaching trays have been made so the patient can maintain brighter teeth from time to time._

Dr Matthew Holyoak
BDS, Dip Rest Dent (RCS Eng), MSc (Rest Dent) lectures on aesthetic dentistry for the Diploma in Restorative Dentistry for the Royal College of Surgeons. He has an MSc in Restorative Dentistry and was awarded a Diploma in Restorative Dentistry through the RCS in 2007. He has been involved with implant prosthetics for more than 15 years and is a member of the British Academy of Aesthetic Dentistry and the Association of Dental Implantology UK. For details on Matthew’s courses, contact him on 01253 731800.

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Compobond: Evolution of a new restorative dental material

Author: Dr Irfan Ahmad

Fig. 1. TE DBAs involve etching (red) both enamel and dentine followed by the primer (yellow) and adhesive (green).

Besides the physical and mechanical properties of dental amalgam, one of the main reasons for its success is its clinical simplicity and forgiving technique. The derisory “drill and fill” slogan associated with dental treatment pertinently describes the provision of an amalgam restoration. The usual protocol for amalgam restorations is a single-stage procedure. Following decay excavation and tooth preparation, amalgam is placed directly into the cavity and anatomically curved and burnished. In addition, amalgam restorations are relatively technique insensitive, have favourable wear resistance and high strength, are inexpensive and the postoperative expansion of the material helps “seal” cavity margins.

Amalgam’s demise started in the eighties, with questions being raised about excessive tooth removal for creating undercuts for retention, metal corrosion products, poor aesthetics and possible mercury toxicity. Since then, the profession has sought suitable alternatives for this iconic and ubiquitous restorative material — the candidate: resin-based composites. The last few decades have witnessed phenomenal research and improvement of composite technology, allaying concerns regarding wear resistance, retention of tooth structure, marginal adaptability and post-operative sensitivity. However, the unflagging Achilles’ heel of composites is polymerisation shrinkage, which compromises the longevity of the restoration. Nevertheless, newer materials have sought to overcome many of the negative effects associated with polymerisation shrinkage. The basis for improvement has been two-fold: firstly, a better understanding and efficacy of dentine bonding; and, secondly, development of the chemical composition of resin based composites to meet the challenges of polymerisation shrinkage, including superior physical and mechanical properties to meet the hostile demands of the oral cavity.

In order to appreciate the rationale for the development of compo bonds, it is important to chart the scientific breakthroughs of both dentine bonding and resin-based composites.

_Historical_

The ideal restorative material should be aesthetic, adhesive, abrasion-resistant and bioactive to encourage regeneration, rather than repair, of the dental hard tissues. The last six decades have witnessed the introduction of many innovative materials as amalgam substitutes, and to fulfil the criteria of an ideal restorative dental material. These newer materials can be categorised as resins and glass-ionomers with numerous hybrids, consisting of combinations of both materials. Resins yield a superior bond to enamel, but a less predictable bond to dentine.

Conversely, glass-ionomers bond better to den-
Dentine bonding agents

The acid-etch technique, introduced by Buonocore in 1955, was seminal and opened the doors to the possibilities of achieving a bond to natural tooth substrates with artificial acrylic-based restoratives.6

Whilst bonding to enamel has changed little since its inception more than half a century ago, bonding to dentine has proved far more elusive, undergoing enormous changes. A major advancement for achieving a sustainable bond to dentine was the introduction of the total-etch (TE) technique7 in the late seventies (Fig 1).

The first self-etching (SE) primer, combining an etchant and primer in a single step, was introduced in the early nineties.8 The SE primers not only simplified bonding to dentine, but also eliminated the clinical errors associated with this exacting procedure.

The result was a more predictable dentine bond and longevity of a composite resin filling. The next decade witnessed many formulations, including etchant+primer followed by adhesive, etchant followed by primer+adhesive, and more recently in the mid-nineties, combining all three constituents, etchant+primer+adhesive, in a single product and a one-step procedure (Fig 2).

Contemporary DBAs can be divided into two varieties: TE or SE. To complicate matters further, the TE bonding systems are available as either three or two-step systems, and SE as either two or one step systems, which are available as three-, two- or one-bottle components. Therefore, to resolve some of these dilemmas in choosing a DBA, simplifying clinical techniques and minimising errors, the current trend is moving away from multi-component and multi-step bonding systems.9 Also, encouragingly, both TE and SE varieties have bond strengths to dentine that are comparable to that of enamel (approximately 22 MPa).10

The salient difference between the TE and SE agents is that an initial etching stage is required with the former, but unnecessary with the latter.

Other classes of materials include siloranes and ormocers. Whilst the silorane-based composites have the lowest polymerisation shrinkage of any resin, they display mixed mechanical properties: flexural strength (FS) and modulus of elasticity (MOE) are higher, but their compressive strength and microhardness are lower compared with methacrylate-based composites.11 Ormocer technology is another addition to the dental restorative armamentarium, having excellent wear resistance, but poor polishability. The evolution of compobonds, launched in 2009, is based on the premise of the promising clinical outcomes of dentine bonding agent (DBAs) and resin-based composites.

Figs. 5, 6, 7. Vertise Flow is a self-adhering flowable composite, combining an SE bonding agent with a resin-based composite.

Fig. 2. SE DBAs combine the etchant, primer and adhesive into a in a single product and a one-step clinical procedure.

Fig. 3. One of the limitations of composite fillings is polymerisation shrinkage, leading to marginal breakdown.

Fig. 4. Polymemisation shrinkage of resin-based composites results in marginal staining.

Fig. 5. Vertise Flow is a self-adhering flowable composite, combining an SE bonding agent with a resin-based composite.

Fig. 6. The bonding agent in Vertise Flow is based on the technological advances of OptiBond, the first filled dentine-bonding agent introduced in 1992, which has now evolved into an SE system.

Fig. 7. When using Vertise Flow, it is advisable to either bevel or etch aprismatic enamel of the cavity margins.
For TE, both enamel and dentine are simultaneously etched, usually with phosphoric acid, and followed by application of the primer and adhesive, or both components together in a single liquid. With SE agents, precursory etching is superfluous, since this is concurrently performed with the primer and adhesive.

Although SE agents expedite the bonding procedure, the major difference between TE and SE bonding agents concerns the smear layer. With TE agents, the etching and drying of dentine is susceptible to clinical errors. This is because the inorganic phase of dentine is dissolved, leaving the organic collagen matrix unsupported. If this organic matrix is not re-hydrated by the primer and adhesive, the dentine bond is severely compromised. Ensuring that the collagen fibres are hydrated necessitates leaving the dentine moist, which is difficult to assess clinically.

Alternately, the DBA should contain a solvent to re-hydrate the collagen fibres, for example water or ethanol, so that the adhesive can impregnate the spaces once occupied by the inorganic phase and form a resin-collagen complex, or a hybrid layer. DBAs containing the solvent acetone are particularly likely to cause desiccated dentine, since acetone evaporates rapidly, leaving collapsed collagen fibres. Therefore, if the adhesive bonding technique is incorrectly executed, the dentine bond will be inferior, causing poor adhesion, marginal leakage, discoloration and post-operative sensitivity. One of the reasons for post-operative sensitivity is inadequate sealing of the dentine tubules following etching during the dentine bonding procedure. The latter is due to inadequate clinical protocols cited above, and in particular plagues TE, multi-step bonding agents.

After the etching phase, the dentine tubules are exposed and at risk after removal of the inorganic matrix and the smear layer. If the next two stages, priming and introduction of the adhesive, are incompetently performed to seal the tubules by formation of an adequate hybrid layer, post-operative sensitivity is an inevitable result.

On the other hand, SE DBAs dissolve, rather than remove the smear layer, which is incorporated within the collagen fibres and the resin monomer to form a viable hybrid layer. Therefore, the reduced post-operative sensitivity reported by some studies with SE agents could be attributed to incorporation of the smear layer into the hybrid layer, and therefore never leaving the dentine tubules exposed. Other studies have reported no difference in dentine hypersensitivity using either TE or SE systems, and poor clinical technique has been mentioned as the most significant factor, rather than the type of DBA, in causing post-operative symptoms.

To summarise, the advantages of SE systems are:
1. less technique sensitive
2. degree of dentine moisture not a concern
3. depth of etching and adhesive penetration are similar, since both processes occur simultaneously.

One of the drawbacks of the SE systems highlighted by some studies is the relatively high pH (≈ 2), compared with traditional phosphoric acid with a pH ≈ 1, resulting in inferior bond strengths compared with TE systems. However, other studies have failed to find significant differences between the two systems, and current research is inconclusive. The SE agents are divided into strong or mild groups, the former having a pH of 1 and the latter a pH of 2.
Although the milder versions are less aggressive and form thinner hybrid layers, a thinner hybridisation zone does not appear to compromise bond strength.\textsuperscript{18} It is the integrity (absence of voids, tears) rather than the thickness of the hybrid layer that appears more significant to a viable dentine bond. Another possible drawback with the one-step SE agents is residual water that may remain in the dentine tubules, thereby leading to incomplete polymerisation of the adhesive, and ultimately compromising retention.\textsuperscript{19} However, SE agents are innovative products in their infancy, and further in vivo medium and long-term trials are necessary to investigate these concerns.

The eighth and future generations of DBAs should improve on the seventh generation of SE bonding agents by incorporating substances for regenerating natural hard tissues, rather than limiting their functions to adhesion. These new so-called bio-materials should have anti-bacterial, bioactive and biofunctional properties, amongst other properties.

\textbf{Resin–based composites}

The number of resin–based composites on the market is both impressive and overwhelming. Developments in composite technology over the last few decades has resulted in many novel products, and selecting the correct material for a specific clinical scenario is both daunting and perplexing. The following generic classification categorises contemporary resin-based composites, together with their properties and uses:

1. \textbf{Hybrids:} Universal or general purpose; low wear resistance, long-term increase in surface roughness, for example posterior restorations, Class I and II

2. \textbf{Micro–filled:} More aesthetic than hybrids, retains surface polish/lustre over time, for example Class III, IV and V; highly filled (loaded) variants for extreme occlusal loads, for example Class I and II

3. \textbf{Nano–filled:} Similar to micro–filled, most aesthetic; aesthetically demanding regions of the mouth, high polishability, excellent optical properties (opalescence, fluorescence), for example Class III, IV and direct composite laminate veneers

4. \textbf{Micro- and nano–hybrid varieties:} Universal or general purpose

5. \textbf{Flowables:} Low viscosity, low MOE, low filler content. Suited for areas of low occlusal loads due to poor wear resistance, low strength and increased polymerisation shrinkage. However, polymerisation stress is also lower owing to the reduced filler content. Ideal for small pits and fissures not exposed to occlusal loads, primary dentition restorations, blocking undercuts for indirect prostheses (for example, inlays and crowns) and stress-relieving liners for deep Class I, II, V and large cavities, preferably fluoride-releasing varieties, for example giomer.

Ideally, composites should possess similar physical, mechanical and optical properties to the natural hard tissues they are replacing. Therefore, for highly aesthetic restorations, where appearance and optical issues are of paramount concern, the ideal choice is a micro- or nano-filled composite. However, the latter are unsuitable for high-stress-bearing posterior restorations owing to poor wear, and in these circumstances a prudent choice is a universal composite, for example a hybrid or micro- or nano–hybrid.

Whilst resin–based composites have revolution-
ised restorative dentistry, they are not without their problems. The main reason for the failure of composit fillings is marginal breakdown and secondary caries.20 However, it is not a fait accompli that secondary carious lesions will ensue in the presence of an open or discoloured cavo-surface margin.

The current thinking is that patient risk factors, such as oral hygiene, dietary considerations and attitude towards dental treatment, are pivotal in determining whether decay will occur.21 As previously stated, marginal breakdown is attributed to polymerisation shrinkage of a composite during its setting stage, ranging from two to five per cent by volume,22 causing stresses that lead to bonding failure and gap formation (Figs 3 & 4). Polymerisation stresses can be mitigated by the clinical technique, MOE of the material and cavity configuration or the “C” factor. In an effort to circumvent polymerisation shrinkage, manufacturers have altered the chemical composition of composites to have favourable properties.

These include varying the size, shape and volume of the inorganic filler particles, as well as improving adhesion of the fillers to the organic resin matrix. Other factors that reduce stresses are the method of setting reaction, for example using pulse curing,23 and incremental build-up of the composite filling during placement.24 Another technique (discussed below) is using flowable composites with a lower MOE as the initial base-lining layer to absorb polymerisation stresses and counteract forces at the restoration-dentine interface.25

_**Flowable composites**_

Flowables, introduced nearly two decades ago, have become ubiquitous for many applications. They exhibit greater fluidity and elasticity, offering better adaptation to internal cavity walls and are very user friendly. In addition, the radiopacity of these resins allows effortless detection of secondary caries, and reveals marginal integrity or open margins. A restorative material should possess radiopacity that is slightly greater than enamel to distinguish decay,26 and greater than the ISO minimum standard or equal to or greater than an equivalent thickness of aluminium. This is especially significant if flowables are used as intra-coronal initial lining layers below subsequent increments of universal composite.

The ISO standard for minimum FS of outer occlusal restorative materials is 80MPa, which is displayed by most of the current flowables on the market. The FS depends on the specific proprietary material, ranging from 70 to approximately 100MPa, deteriorating over time, and is approximately 80 per cent compared with non-flowable analogues.

Although micro-leakage is a multifactorial phenomenon, MOE of the material is a crucial factor that determines its magnitude. Similar to FS, MOE is variable, depending on the product, ranging from three to over 11GPa, and also decreasing over time. The viscoelastic properties of a flowable determine its flowability and clinical handling. The flow characteristics of flowable composites can be divided into low, medium and high flow.27 Each variety is suitable for different clinical tasks. For example, a highly flowable material is desirable as a liner or fissure sealant, to adhere to cavity walls or fissures crevices intricately, while a less flowable variety is preferable for small cavities or repairs, where excessive slumping is a nuisance.
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Currently, most of the flowable composites possess little bacterial inhibitory potential, especially against S. mutans, the main infective agent of dental caries. Whilst a few flowables on the market claim anti-bacterial activity, the effect is usually ephemeral, effective for only a few days. Future composite developments should endeavour to incorporate both anti-bacterial and bioactivity in their formulations for enhanced therapeutic value.

In conclusion, flowables are useful for areas of reduced occlusal stresses, but are contra-indicated for bulk build-ups in stress-bearing areas. Their popularity is due to ease of use and flexible adaptability, especially in areas of limited access. The clinical applications include fissure sealing, small cavities, base liners, repairing voids in defective restorations and blocking undercuts for subsequent indirect prostheses.

_Evolution of a new resin-based restorative: Compobond_

As discussed above, the state-of-the-art of dentine bonding systems are the SE agents that obviate the need to perform an initial etching phase, while yielding bond strengths that are comparable to bonding to enamel. Also, the pinnacle of resin-based composite technology is the introduction of nano and nano-hybrid composites. The advancements in both bonding agents and resins have now evolved by uniting these two materials to produce a new dental restorative: compobond.

Compobonds exploit the benefits of SE DBAs to tooth substrate, and are termed self-adhering composites. In essence, an era is emerging in which composites, similar to amalgam fillings, can be placed in a single step, eliminating errors, expediting protocols, and improving predictability and longevity of restorations.

The first compobond, called Vertise Flow (Kerr), was introduced in 2009, a self-adhering flowable combining a resin-based composite and an SE bonding agent based on the seventh-generation DBA OptiBond All-in-One (Kerr). Vertise Flow is a light-cured composite with similar properties to conventional flowables but with the added advantage of eliminating the bonding stage that is prerequisite before using any resin-based restorative.

**Characteristics and properties of Vertise Flow**

Vertise Flow incorporate the properties of the DBA OptiBond, the first filled bonding agent introduced in 1992 (Fig. 6), that realised the potential of using a filled adhesive as a shock absorber beneath resin-based composite restorations. The bonding mechanism of OptiBond to dentine is two-fold: firstly, chemical adhesion is realised by the phosphate function group of the GPDM monomer (glycerol phosphate dimethacrylate) uniting with the calcium ions within the tooth; and, secondly, micromechanical adhesion by formation of the hybrid layer composed of resin impregnation with the collagen fibres and the dentine smear layer. Initial SEM and TEM images from the University of Leuven, Belgium, show tight adaptation of Vertise Flow to both dentine and enamel. In addition, micro-leakage tests show that Vertise Flow’s marginal integrity is comparable to conventional (ie non-adhering) flowable composite when used in combination with an...
The shear bond strength (SBS) achievable with Vertise Flow and dentine is approximately 25MPa, comparable to bonding to cut, prismatic enamel. However, the SBS is lower with uncut or aprismatic enamel, which is similar to using SE agents alone. For this reason, it is advisable to either bevel or etch aprismatic enamel beforehand to ensure a sustainable and durable marginal seal (Fig 7). Conversely, pre-etching dentine when using Vertise Flow reduces the SBS to dentine, and is therefore contraindicated.

Another disadvantage of pre-etching dentine is opening dentine tubules that may not be sealed to the same depth by the subsequent use of Vertise Flow, and could contribute to post-operative sensitivity.

The chemical composition of Vertise Flow incorporates four types of fillers, with a total 70 per cent loading. The inclusion of nano-ytterbium fluoride yields excellent radiopacity and fluoride release (for bioactivity), the pre-polymerised fillers reduce microleakage, and nanoparticles improve polishability and thixotropic properties. The FS is 120MPa for mitigating bulk fracture, and the MOE is low, approximately 7GPa, for shock absorbing capability (Fig 8).

Because Vertise Flow functions as both a dentine adhesive and a resin restorative material, a longer curing time is necessary to ensure that both constituents are fully polymerised. In addition, the light-curing reaction also halts the etching process of the SE agent, increasing its pH from approximately two to seven, so that continual acidity does not erode the dentine bond.

A further advantage of Vertise Flow is inclusion of the acidic phosphate monomer, which provides chemical adhesion to a variety of intaglio surfaces of indirect prostheses, including non-precious alloys, gold, alumina, zirconia and silica ceramics, for example feldspathic, lithium-disilicate or other pressed ceramic systems. This adhesive property is exceptionally useful for repairing intra-oral fractured porcelain, for example all-ceramic crowns, inlays or onlays, or patching up chipped porcelain defects without replacing the entire prosthesis (Fig 9).

The handling properties of Vertise Flow are favourable for numerous applications. For example, its viscosity occupies a middle ground, neither too viscous nor too runny, and therefore satisfies a wider range of clinical applications, both as a liner/sealant and for entire small cavity restorations. Vertise Flow is available in a selection of shades for the subtlest of aesthetic requirements, ranging from XL for bleached teeth to Translucent for fissure sealing that allows visibility of any future decay (Fig 10).

Similar to glass-ionomers and their variations, compobonds offer adhesion to natural tooth substrate. However, whilst both materials have similar indications, their properties and handling characteristics vary considerably. Glass-ionomers essentially adhere exclusively to dentine, have low mechanical strength, average aesthetics and low wear, but offer both fluoride release and recharge. In addition, the setting reaction is affected by the degree of moisture of dentine, and involves a two-stage clinical procedure. On the other hand, compobonds offer dentine and enamel bonding, high mechanical strength, low
industry report: Compobond

Cosmetic wear, better aesthetics, a single-stage clinical procedure and fluoride release, but not, fluoride recharge.

**Clinical applications of Vertise Flow**

The clinical uses of Vertise Flow are not unlike those of conventional flowables, but with the added advantage of eliminating the bonding stage. Below are some suggested applications.

**Fissure sealing**

One of the fundamental treatments for preventative dentistry is fissure sealing of posterior permanent teeth soon after their eruption into the oral cavity. Traditionally, this has been achieved solely with enamel etching, relying on micromechanical retention, and depending on diet, the fissure sealants require periodic replacement or repair. Using Vertise Flow instead of conventional fissure sealants offers not only micromechanical retention, but also chemical adhesion to the enamel via the SE agent that links with the calcium ions from the hydroxyapatite matrix.

The following case reports on fissure sealing of a first permanent molar tooth in a 14-year-old child. Ideally, the tooth should be isolated with a rubber dam to ensure moisture control and a clear operating field (Fig 11). Initially, the tooth was air abraded with aluminium-oxide powder to clean the pits and fissures, remove the plaque biofilm, superficial incipient decay and, if present, remnants of old fissure sealants (Fig 12). The cleansing was continued with a slurry of pumice to eliminate residues of the aluminium powder (Figs 13 & 14). After rinsing off the pumice (Fig 15), 37 per cent phosphoric acid was dispensed to etch the pits and fissures (Fig 16a) and surrounding uncut, aprismatic enamel (Fig 16b). The classic frosty etched enamel appearance was clearly visible after rinsing off the etchant and drying the occlusal surface (Fig 17).

Since Vertise Flow should be refrigerated to ensure extended shelf life and optimal performance, it is advisable to remove it beforehand to so that the material reaches room temperature. The Translucent shade of Vertise Flow was dispensed generously (Figs 18 a&b) and brushed onto the enamel to ensure intimate contact with its surface, and spread to a thin layer of less than 0.5mm (Figs 19 a&b). The coated surface(s) were light cured for 20 seconds with a curing light with an output of 800 MW/cm² (Fig 20).

The rubber dam was then removed and articulation paper placed to check occlusal contacts (Fig 21). All the articulation paper marks, except those on the supporting buccal cusps (palatal cusps for maxillary teeth), were adjusted and polished with Opti1Step Polisher (KerrHawe SA; Figs 22 & 23).

**Small, non-stress-bearing, non-contacting cavities**

Small cavities in areas of minimum occlusal stress are ideal candidates for minimally invasive, microdentistry. Incipient carious lesions either can be monitored if the patient risk factors are low or may require intervention for patients with a propensity for dental decay. In this case, a 13-year-old female patient, who is an occasional attendee and relatively indifferent to dental treatment, was treated.

The preoperative status shows the maxillary
second pre-molar and first molar with occlusal cavitations, and an old defective composite occlusal restoration in the molar (Fig 24). Cavity preparation was carried out using small diamond burs specifically designed to minimise removal of tooth substrate (Fig 25). Current research shows that it is unnecessary to remove all decayed dentine. Instead, the cavity margins are clearly defined for creating a hermetic seal for guarding against the negative effects of the dental biofilm, which perpetually colonises the tooth surface.30 As previously mentioned, in order to improve bond strength to aprismatic enamel, the margins can be either etched or bevelled (Fig 26). The initial layer of Vertise Flow should be less than 0.5 mm in thickness and pressed into the recesses of the cavity floor and walls (Figs 27a & b). The initial layer of Vertise Flow was first light cured (Fig 28) before completing the cavity with additional layers. Finally, the restoration was polished with Opti1Step Polisher and an OptiShine brush (KerrHawe SA) to yield a high lustre gloss (Fig 29).

**_Class V and small buccal cavities_**

Class V cavities have variable presentations. The exposed dentine in Class V cavities can be the result of enamel loss due to erosion, abrasion abfraction or infectious caries. The dentine reaction is highly erratic, often leading to formation of hyper-mineralised sclerotic dentine that is resistant and less receptive to dentine adhesion.31 Therefore, in the presence of sclerotic dentine, all DBAs are less efficacious and present a challenge for dentine bonding. For this reason, Vertise Flow is unsuitable for Class V lesions with blatant dentine hyper-mineralised sclerotic dentine.

If sclerotic dentine is absent, adhesion with DBAs is superior (28MPa) compared with compomers (15MPa) or a glass-ionomer (2.5MPa).32 For small buccal cavities within enamel, Vertise Flow is the ideal material of choice, as shown in the following case.

Preoperative articulation paper marks verified that the buccal lesion was free of occlusal, stressbearing contacts (Fig 30). After isolation with a rubber dam, the tooth was cleaned with a slurry of pumice (Fig 31) and a cavity was prepared with bevelled enamel margins (Fig 32). The final result shows restoration of the cavity with A3 Vertise Flow after polishing with Opti1Step Polisher (Fig 33).

**_Stress-relieving linings_**

The rationale for using different composites for various increments of a restoration is that the materials should possess similar properties to the natural dentine and enamel they are replacing. Dentine has a lower MOE and is therefore better able to absorb stresses than enamel. For this reason, in circumstances in which the cavity extends into dentine, the initial layer of composite should have shock-absorbing capabilities that are similar to dentine.

The polymerisation contraction stresses of a resin-based composite are directly related to its filler volume, which also affects its mechanical properties, such as wear resistance and MOE. High filler content results in less contraction, which in turn influences the marginal integrity of the restoration.33 Flowables have approximately 25 per cent less filler than their nonflowable counterparts and therefore undergo increased volumetric shrinkage. However, since flowables have about 50 per cent less MOE than non-flowables, they can absorb more stresses and, in theory, maintain superior marginal integrity.34
The MOE of flowables ranges from as low as 1.4GPa (low filler volume) to as high as 12.5GPa (high filler content). In addition to filler content, other constituents such as the type and quantity of resin, photoinitiators and accelerators also influence the final MOE of the material. As a generalisation, flowables with a lower MOE may act as shock absorbers when placed as pre-cured liners below subsequent increments of non-flowables. But current studies are inconclusive regarding this beneficial property, and further research is necessary to clarify the issue.

In the following case, large Class I cavities in two mandibular molars were restored using Vertise Flow as an initial layer to act as a shock absorber before completing the restoration with subsequent layers of a non-flowable composite. This case shows the second and third mandibular molars with defective amalgam restorations requiring replacement. In addition, these teeth also exhibit bruxism activity with tooth wear, resulting in occlusal enamel loss. Initial occlusal contacts were verified (Fig 34) before placing a rubber dam and removing the amalgam restorations.

Notice the extensive decay in the third molar (Fig 35). Since molars are prone to high occlusal forces, placing bevels on enamel margins is unsuitable because the thin layer of composite resin periphery is likely to fracture during mastication. However, to achieve an efficacious bond to aprismatic enamel, it is prudent to etch the periphery while maintaining a 90° cavo-surface angle (Fig 36).

After thoroughly rinsing and drying, the etched enamel periphery of both cavities was clearly visible (Figs 37 & 38). Vertise Flow was dispensed into the cavity, brushed to ensure that the material was evenly spread along the cavity walls and floor, making sure that its thickness did not exceed 0.5 mm (Figs 39–40b). This initial layer of Vertise Flow was light cured for 20 seconds and acted as the stressrelieving lining (Fig 41). Subsequent layers of the filling were built-up using increments of a regular composite, Herculite XRV Ultra (Kerr), to replace dentine, and then successively building-up the buccal and lingual cusps separately without contacting the opposing sides (Fig 42).

Staining fissures is a contentious issue; some patients are indifferent to this practice, while others adamantly refuse to have their teeth stained. For those patients who are unconcerned, fissure staining and patterns impart a realistic appearance to a composite filling. The technique involves using different stains, for example Kolor + Plus (Kerr), that are dragged through the unset composite resin using an endodontic reamer or file (Figs 43 & 44). Once the desired fissure pattern had been created, the composite was light cured (Figs 45 & 46). After removing the rubber dam, articulation paper was used to check occlusal contacts (Fig 47), and necessary adjustments were made to ensure occlusal harmony. The final stage was achieving a high surface lustre and texture using Opti1Step Polisher. The post-operative view shows composite fillings emulating natural cusps and fissure patterns, with imperceptible transition between the composite filling and surrounding natural tooth (Fig 48).

Blocking undercuts

Another useful application of flowables is blocking undesirable undercuts prior to providing indirect restorations. Undercuts often complicate many
clinical and laboratory procedures, for example impression making or restoration fabrication. Unwanted sharp line angles or deficiencies, such as voids, can readily be blocked and sealed with the easily adaptable flowable composites for both intra- and extra-coronal tooth preparations.

In the following case, a large amalgam restoration with underlying profound decay was scheduled for an indirect ceramic inlay. After isolation with a rubber dam, the amalgam filling from the maxillary molar was removed, revealing gross carious dentine (Fig 49).

All soft, carious dentine was exacted, leaving blantly undercut (Fig 50). Due diligence was exercised not to remove all the hard, deeper decayed dentine to avoid possible pulpal exposure. In this instance, Vertise Flow has a dual function: firstly, to block undercuts; and, secondly, to act as a stress-absorbing liner for the subsequent indirect ceramic inlay (Fig 51).

Repair

Lastly, Vertise Flow can be used for minor repairs, for either chairside or laboratory-made, acrylic based temporary restorations such as crowns with air blows or chips or fractures after a period of use in the mouth. Once again, the repair protocol is simplified and predictable, involving a single step, with the added benefit of the SE bonding agent within Vertise Flow.

Another form of repair involves the increasingly problematic fractures associated with ceramic prostheses, such as crowns or inlays. Since these types of all-ceramic indirect restorations are increasingly popular, the number of fractures is also becoming progressively more common, and replacement is costly. Traditionally, ceramic fracture repair involved several stages that is etching with hydrofluoric acid, silanation and repairing with conventional resin-based composites, either a flowable or non-flowable variety.

As previously mentioned, Vertise Flow incorporates an acidic phosphate monomer, which links chemically too many ceramic substrates, such as silica, alumina and zirconia. Therefore, after roughening the fracture “lesion” with a diamond bur, only a single step is necessary with Vertise Flow, which combines both chemical bonding and a repairing composite to “heal” the fracture.

The following case illustrates repair of a fractured, alumina core crown, veneered with silica (feldspathic) porcelain. The patient presented with a distal fracture of the all-ceramic crown on the maxillary left central incisor (Fig 52). A shade analysis was performed with the Vita Classic shade guide (VITA). Vertise Flow A2 was chosen for the body of the crown, and the Translucent shade for the incisal edge translucency (Fig 53). Initial cleansing was carried out with a slurry of pumice to remove the plaque biofilm (Fig 54).

To increase the surface area for bonding, the fractured porcelain requires pre-treatment roughening, which can be achieved either mechanically or chemically. The choice is mainly empirical, depending on the clinician’s personal experience and penchant for either technique. Mechanical roughening involves using a rotary instrument followed by cleansing the site with phosphoric acid (Fig 55), which does not...
etch porcelain, but removes any remaining debris (Fig 56).

The chemical method involves etching the porcelain with hydrofluoric acid for three minutes. It is important to note that only silica-based ceramics can be etched with hydrofluoric acid, and if the fracture extends deeper into an alumina or zirconia substructure, the latter will require mechanical roughening with a diamond bur.

Customarily, the next stage is application of hydrofluoric acid and silane for creating a silica–silane bond. However, this is superfluous when using Vertise Flow, as the latter incorporates an acidic phosphate monomer that bonds to silica, as well as alumina and zirconia ceramics. The A2 shade of Vertise Flow was dispensed directly onto the etched fracture site (Fig 57), and spread intimately, ensuring firm contact with the porcelain (Fig 58). In order to mimic the incisal edge translucency, the Translucent shade of Vertise Flow was used at the incisal edge (Fig 59), and slightly overbuilt to compensate for the polishing stage (Fig 60). Finishing and polishing were carried out using sequentially finer grit discs (OptiDisc, Kerr; Fig 61), creating a surface roughness (Ra) of approximately 0.2μm, equal to or less than the threshold required for bacterial and plaque adhesion (Ra = 0.2μm). The post-operative result shows the polished repair harmoniously blending with the surrounding porcelain (Fig 62).

Similar to porcelain repairs, existing chipped or marginally stained composites (both direct and direct restorations) can be effortlessly repaired. The protocol is minimally invasive, economical, quick and spares the patient protracted appointments to replace the entire restoration, which can instead be monitored at periodic recalls.

**Conclusion**

This article has introduced the evolution of a new dental restorative material, the compobonds. The discussion has focused on the rationale for the development of compobonds, citing technological advances in both DBAs and resin-based composite formulations. In addition, a proprietary product, Vertise Flow is described as the first generation of flowable compobonds with clinical applications similar to existing flowable composites, and some novel uses, such as direct, intra-oral, porcelain fracture repairs. The benefits of combining an SE DBA with a composite-resin eliminate the technique-sensitive protocols associated with dentine bonding, making the entire process simpler and more predictable. However, as with any new material, scientific scrutiny and clinical trials will untimely judge the efficacy of compobonds and, if successful, will pave the way for non-flowable varieties to simplify direct composite restorations.

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

**contact info**

Dr Irfan Ahmad
The Ridgeway Dental Surgery
173 The Ridgeway, North Harrow
Middlesex, HA2 7DF
UK
iahmadbds@aol.com
www.irfanahmadtrds.co.uk
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Over the years there have been many trends in dentistry and as they come and go they leave their mark – some positive, some negative. As a result our experience will be greater and dentistry will be advanced and/or changed in some way. Most recently we have ridden the cosmetic wave with an emphasis on creating the perfect smile, at almost any cost. Patients’ desires for immediate results coupled with most dentists preference to pursue a restorative option has probably resulted in some over zealous tooth preparation. However, patients who required restoration anyhow will undoubtedly have benefitted from dentists’ greater understanding of smile design. Also the profile and perception of dentistry have been enhanced with patients now appreciating the benefits and desirability of dentistry rather than dentistry being seen as a necessary evil. With an ageing population who want to look good and expect to keep their teeth for a lifespan that has never been longer, the expectations of dentistry have never been greater.

Trends

Trends in dentistry tend to be introduced around new dental tools. For example, the development of increasingly thinner, stronger and more beautiful porcelains together with improved bonding techniques have propelled the cosmetic wave. We need to remember that whilst it is very important to move with the times and embrace new technologies it is also essential to appreciate the concepts that underlie good dentistry and never forget the timeless principles that have stood the test of time.

These days much is written about “comprehensive dentistry” as a concept, but what does that mean? Comprehensive or complete dentistry is about treating the patient as a whole rather than as a “mouth”
and understanding the balance that exists between function & aesthetics, biology & structure. It is also about understanding the psychological and psychosocial ramifications that exist for each patient.

Sometimes we dwell too much on just one aspect. Whilst patients may ask us to create a beautiful smile, I doubt that there are many patients who don't expect health, comfort, function and longevity to be delivered at the same time. Similarly there are few patients who would accept a functional result that did not at least look reasonable. Understanding and managing the patient's expectations is without doubt the most fundamental part of any treatment plan. Taking the time to do this is crucial to a satisfactory result and a happy patient. We also need to remember that a patient may not share the vision that we have of how their treatment may end up. There are many tools at our disposal to do this from digital imaging and diagnostic wax ups to showing examples of completed treatments. It is also often possible to develop a treatment plan in stages, allowing a patient to stop at the point where the result is appropriate for them.

__Scheduling treatment__

Barry's main concern was that his front teeth continued to break down and he was afraid of losing them. He presented with erosion, decay and attrition together with mild periodontal disease. He was unconcerned about the appearance of his teeth at this stage. However, often such patients desire a more aesthetic result once their initial concerns have been met. In this case, after initial periodontal therapy and tooth whitening we were able to restore the teeth with a simple single layer composite system to achieve the patient's structural, functional and biological requirements. Once these parameters had been met the patient was able to reassess his aesthetic goals with a more positive approach. Despite uneven gingival levels and the basic aesthetic level, the patient was delighted with the result and has continued to maintain an excellent hygiene regime. The treatment was cost effective and fulfilled the patient's needs and desires. Whilst he understands that composite restorations may require some degree of maintenance, he is willing to accept that.

This process of scheduling the treatment or "progressive smile design" can also be very beneficial in helping patients spread the cost of treatment over time, particularly important at these difficult economic times. Employing this approach will almost always ensure a more natural result and certainly produces a solution that is appropriate to meet each patient's individual needs and desires. In order to develop a staged treatment plan it is very important to understand the treatment options that we have available to us together with the tools and materials that we have at our disposal.

Paul attended wanting to improve his smile whilst understanding that there was significant structural and biologic damage to his teeth (Fig 1). He was found to have moderate periodontal disease together with erosion, attrition and caries. He also wanted to improve his smile for a trip to America in just three weeks' time! Based on a thorough examination and
recording process together with listening carefully to the patient’s requirements we were able to develop a suitable treatment plan that would allow us to continue to work on the patient’s periodontal needs whilst at the same time improving his smile and helping him to envision what could be achieved. Initial periodontal therapy was commenced and a diagnostic wax up produced on mounted models. After ensuring that the patient understood the limitations of the procedures to be provided together with the need for further treatment, single layer hybrid composite restorations were placed in accordance with a stent constructed from the diagnostic wax up (Fig 2). We were able to meet his deadline for his journey to America and at the same time help him to see how his appearance may be improved. The patient returned a month later delighted with the result and highly motivated to further improve the aesthetics. After his periodontal condition had been stabilised, porcelain crowns were placed 12, 11, 21, 22 and 23 to restore structure, function and aesthetics (Fig 4). Elsewhere, composite restorations were left in place. The patient was totally satisfied with the treatment provided and maintains his hygiene with renewed vigour.

_Treatment Options and Timeless Principles_

Forty years ago Dr Peter Dawson spoke about the concept of complete dentistry. He became known for function and occlusion not because it was the only part of comprehensive dentistry that he taught but because he explained those concepts so well and how they had an impact on every other aspect of dentistry. The tools and materials that we use may have changed but the balance that he spoke about (Fig 1) is just as important today as it was back then.

Similarly he listed the treatment options that are available to us:

**Treatment Options**

<table>
<thead>
<tr>
<th>Re-Shape</th>
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<tr>
<td>Re-Position</td>
</tr>
<tr>
<td>Restore</td>
</tr>
<tr>
<td>Reposition bone (surgery)</td>
</tr>
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</table>

At first glance the table above looks just to be a list of options but if considered in this order at the treatment planning phase it will enable us to practice truly minimally invasive dentistry. The concept of minimally invasive dentistry has been around since the 1970s but the emphasis of this was solely on the biological aspects of patient care. More recently there has been a move towards minimally invasive cosmetic procedures with a much greater emphasis on orthodontics (repositioning), tooth whitening and simple bonding procedures (alignment, bleaching and bonding).

Most dentists have always accepted that if the teeth are a good shape but in the wrong position it is much more appropriate to move the teeth to position rather than to restore them into position. However, many patients would refuse orthodontics because of the time it would take and the appearance of “train track” braces. This has spurred the development of other ways of moving teeth which are much more acceptable to patients. Lingual orthodontics, ceramic brackets and clear aligners such as Invisalign have become very popular as has the Inman aligner which is removable, offers quicker treatment times and is...
less expensive (Figs 7 & 8). These are just a few of a number of systems available today. Again it is important to understand that each of these is just a tool to help us in providing a comprehensive and appropriate result. Straight teeth that aren’t biologically sound or don’t function properly are not a satisfactory result. Orthodontics can also be an extremely important prerestorative treatment correcting gingival levels and minimizing or eradicating the need for tooth preparation. Many patients will require a combination of treatment options to produce an acceptable result.

Summary

With the development of improved, more patient friendly treatments and the fabulous array of materials we have available to us today we have never been better placed to practice minimally invasive COMPREHENSIVE dentistry to fulfill the needs and desires of even our most demanding patients. However, we must remember that to achieve a great solution for any patient it is critical that we listen to them carefully so that we may understand what an appropriate result may be for each individual. At the same time we must have our own clear and well-defined goals such that we deliver a treatment that is maintainably healthy, structurally sound, functionally correct and aesthetically pleasing to that patient. Perhaps most importantly we should remember that it is understanding the timeless principles and overall concepts that will allow us to use the tools available today or developed in the future for the benefit of our patients keeping them happy and healthy for a lifetime and not just the next few years._

Ian Buckle is the Director of the Dawson Academy in Europe offering a structured hands-on curriculum at his Practice and teaching facility on the Wirral, close to Liverpool and Manchester, and in London. For details of this curriculum or for details of his latest lectures “An Introduction to Occlusion” and “Minimally Invasive Comprehensive Dentistry” (available at various locations throughout the UK) visit www.bdseminars.com
Occlusion & Aesthetics
Comprehensive Dentistry

The Dawson Academy
The Dawson Academy is a postgraduate educational facility dedicated to the advancement of dentistry. All our instructors are practicing dental professionals who have implemented the Dawson teachings into their own practices and bring that real-world experience back into the classroom.

The recommended path of learning through the basic Core Curriculum will provide the principles and skills necessary for the successful practice of complete, quality, predictable dentistry with primary concentrations in occlusion, the temporomandibular joints and comprehensive aesthetic restorative dentistry.

Core Curriculum
The Core Curriculum at The Dawson Academy UK has been developed as a complete plan for general dentists, specialists and dental practice team members striving to develop a highly effective practice. The continuing education courses have been designed to clarify the concepts and provide hands-on training in the skills that are needed to practice master quality, complete dentistry.

Our dental continuing education hands-on classes are held at The Dawson Centre UK and are limited in enrollment to afford participants the maximum opportunity to practice the skills in a hands-on format. We utilise state of the art learning techniques to ensure that students go beyond just understanding principles to actually being able to implement the concepts and skills in their practices.

Ian Buckle BDS
Senior Faculty Member, Director, The Dawson Academy UK
Ian is the first International member of the teaching faculty at the Dawson Academy for Advanced Dental Education in St. Petersburg, Florida.
Ian is Director Of Dawson Academy based in England UK and is directly involved in hands-on courses within the curriculum. Ian qualified from Liverpool University in 1988. He has over 20 years experience in general practice both in the Private sector and with the National Health Service. He has achieved Masters level in Aesthetic dentistry with the Rosenthal Institute based at New York, completes over 100 hours of postgraduate education every year and lectures nationally and internationally on functional and aesthetic dentistry.
Dr. Buckle runs a Private Practice in the picturesque village of Thornton Hough on the Wirral concentrating on comprehensive reconstructive, aesthetic and implant dentistry. The Practice has a dedicated seminar room where seminars and study groups are held on a regular basis.

John C. Cranham DDS
Clinical Director, The Dawson Academy
Dr. Cranham is the Clinical Director of The Dawson Academy where he is involved with many of the lecture and hands-on courses within the curriculum. As an active educator, he has provided over 650 days of continuing education for dental professionals throughout the world.
An honors graduate of the Medical College of Virginia in 1988, John maintains a strong relationship with his alma mater as an Associate Clinical Professor.
He has an aesthetic oriented practice in Chesapeake, Virginia, USA and is an internationally recognized speaker on the Aesthetic Principles of Dentistry, Contemporary Occlusal Concepts, Treatment Planning, Restoration Selection, Digital Photography, Laboratory Communication, and Happiness and Fulfillment in dentistry.
As a published author, Dr. Cranham has a strong commitment to developing sound educational programs that exceed the needs of today’s dental professional.

LEARNING OBJECTIVES
• Establish fees and acquire skills to educate patient during treatment planning
• Locate, verify and precisely record centric relation and mount casts
• Record a correct Facebow
• Acquire skills to shoot a full series of diagnostic clinical photographs
• Acquire an efficient record gathering process

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10%
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Module 1
• Establish fees and acquire skills to educate patient during treatment planning
• Locate, verify and precisely record centric relation and mount casts
• Record a correct Facebow
• Acquire skills to shoot a full series of diagnostic clinical photographs
• Acquire an efficient record gathering process

Module 2
• Aesthetic Principles of Dentistry
• Contemporary Occlusal Concepts

Module 3
The Art & Science of Equilibration
Anterior Teeth

Module 4
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Tim Earl, East Sussex
“I have changed the way I practice dentistry. The course fees plus a lot more in just six weeks.”

Harvinder Singh Thiara, Nottingham
“Moving from a traditional to a modern dental practice has increased massively. I had easily recouped my investment in the Dawson teachings in the simpler cases.”

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Location: Wirral

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<th>Summer 2012</th>
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<th>Module 4: Restoring Anterior Teeth</th>
<th>Winter 2012</th>
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<td>Jul 5th-7th</td>
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**LEARNING OBJECTIVES**

- Acquire an efficient record gathering process
- Aquire skills to shoot a full series of diagnostic clinical photographs
- Record a correct Facebow
- Locate, verify and precisely record centric relation and mount casts onto an appropriate articulator
- Establish fees and acquire skills to educate patient during the Examination
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- Tim Earl, East Sussex

"Attention to detail and quality in EVERY step. Finally discovering the proper way to do dentistry is a rebirth! I am really putting the concept and the knowledge to work."

- Claus Dønvang, Denmark

"I felt the pace of theory and hands on was spot on, clearly understandable processes to take back to my own practice."

- Steven Rees, Buckinghamshire

"Life-changing (dentally!) every dentist should attend."

- Neeta Shah, Middlesex

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Have you ever bought a car for cash? I haven’t. My parents probably did but I’ve always needed a loan for the purchase. In my parents’ day hire purchase was referred to as ‘the never–never’. Perhaps borrowing money was a bit taboo in those days. Now it’s not. Even my children ask for an advance on their pocket money.

Despite this, I know of relatively few cosmetic dentists who offer finance terms to their patients. This despite typical treatment plans ranging from £1,000 to £10,000. Surely these are sizeable sums which few people would be expected to fork out in one payment?

Failure to offer easy payment terms has another consequence. Presented with a five-figure treatment plan, most, if not all, patients will wish to think about it. This means they go home, discuss the plans with family and friends and quite possibly receive a negative reaction to the cost. It becomes increasingly likely that they’ll say, “No,” or, more accurately, never say, “Yes”.

The cost of the treatment maybe only one factor. In my experience, a whole range of circumstances may affect patients’ decisions. Some dental practices, both general and specialised, commission me to work on their behalf as a patient coordinator. This means I get to speak with a lot of patients who have recently been given treatment plans. I invariably call patients in the evenings when they’re at home and relaxed.

Here are some of the things patients tell me.

Patient G: She has sold her share option from her workplace but due to the current market and the company dividing its business the shares halved in value to £2,500. She is due to get more shares in March and will sell them straight away but she needs to clear her credit cards first.

Patient T: Patient was happy to talk about his treatment and said that he definitely wanted to proceed with it. However, he had been advised quite firmly by XXXXXX that it would be a waste of money to proceed with the treatment without giving up smoking.

He gave up smoking on 1 January 2011 and wishes to continue for another six to eight weeks to ensure he can stick with it before embarking on the treatment.

Sometimes, a patient coordinator will get told things they’d rather not hear for the sake of the practice. Nevertheless, it is better to know when a patient is not satisfied – so that the situation may be rectified and the problem avoided with other patients. Here’s one example.

Patient B: Patient was actually very disappointed. She had phoned the practice a couple of weeks ago to speak to XXXXXX and left message with receptionist to get him to call. She feels sure he must have got the message as she was advised that he was working at the practice on the day that she rang. She is still waiting for a call back and when I suggested that XXXXXX be given the opportunity to call her as soon as possible, she said she had already lost trust in him as a dentist.

Returning to my buying a car scenario, I liken the role of a patient coordinator to that of a successful salesperson. Don’t think pushy, in-your-face, Arthur Daley character. Think friendly, helpful person genuinely interested in helping you make the right decision.

Although a test drive is very informative, queries still arise when you get home. So it is with patients and treatment plans. “What did the dentist mean exactly by ‘my teeth will protrude slightly by the end of the treatment?’ I don’t want to look goofy!” or “How many appointments will I need?”
Presenting them with a decent treatment plan can allay many post-visit concerns that patients have. No, not £3500 scribbled on a ‘sticky’. A proper plan should itemise the treatment proposed explaining the purpose of each stage, how long it will take, what any side effects might be and translating technical terms into plain English. Diagrams and/or photos are useful and you should include information about your practice to remind patients why you offer the best cosmetic dentistry around. At the end include a summary of the costs and the total. Why not be radical and follow the example of most other businesses that offer quotes and state your hourly rate and show the material and lab costs as separate items?

Even so, my experience is that giving patients the opportunity to talk things through with someone from the practice will increase treatment plan take-up. This is the role of the patient coordinator. But they need to be able to offer an important benefit if take-up is to be significantly increased. The benefit is finance at low or zero interest rates. Suddenly, your £5,000 cosmetic treatment plan becomes a more affordable £3.45 per day, (less than the price of a cup of high street coffee) equivalent to £104.95 per month for five years. Even the £10,000 plan sounds better when talked about as £209.99 per month for five years.

I can hear your objection already! Dentists I speak to about offering finance terms often say initially that they don’t want patients to overstretch themselves financially. Let’s think this through.

First, if you don’t offer finance, what’s to prevent patients seeking a loan from elsewhere or putting the bill on their credit card? Second, the companies who offer financing for dental treatment are covered by the FSA (Financial Services Authority) which means they must make the appropriate checks to ensure patients can manage the repayments. No company offering loans wants defaulters. As a practice you will need a Category C Consumer Credit Licence and that carries a responsibility to comply with the law regarding offering/brokering finance terms. My third point is a moral one – who are you to decide whether your patients should take out finance to pay for cosmetic treatment? Surely, they have the right to decide!

So let’s run through the ideal scenario. You examine a patient seeking cosmetic treatment and advise them verbally what procedures you suggest. They leave the treatment room (allowing you to continue with the next patient) and are met by the patient coordinator. He or she presents the patient with a smart folder detailing the suggested treatment and the cost involved. The patient coordinator talks through the various options for paying (cash, cheque, card etc.) then enquires whether the patient would like to know about the competitive finance available. If so, they can write down some repayment figures based on what deposit the patient can afford and over what period they wish to repay. The patient departs to think about it.

A few days later, the patient coordinator telephones the patient one evening. Having ascertained that the timing is convenient, they ask if the patient now has any concerns about the treatment plan. Patient coordinators need a working knowledge of cosmetic terms and procedures but needn’t be listed with the BACD. Once they’ve resolved any queries, the patient coordinator can discuss payment with the patient – generating new monthly repayment figures if the patient has decided on a different size of deposit or a different repayment period. Then it’s just a question of the patient coordinator asking if the patient wishes to go ahead. If the patient has expressed an interest in finance and can recall the fee for the treatment then most will proceed – at least that’s my experience when acting as a remote patient coordinator) the patient says: “Yes!”

You may never hear “never” again....

A proven manager of change and driver of dramatic business growth, Jacqui Goss is the managing partner of Yes!RESULTS. By using Yes!RESULTS dental practices see an increase in treatment plan take-up, improved patient satisfaction and more appointments resulting from general enquiries. Yes!RESULTS turns good practices into great practices.

Jacqui Goss
Managing Partner, Yes!RESULTS
Ashton House
Sale
Cheshire M33 6HE
Tel: 084566 448066
Mob: 07795 562617
Email: jacqui@yesresults.co.uk
Website: www.yesresults.co.uk
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Keynote’s Olympic Connection

Author Jacqui Goss

_With the British Dental Bleaching Society’s 2012 AGM taking place on the eve of the London Olympic Games, it is a fitting coincidence that keynote speaker Dr. Bruce Matis has more than one personal Olympic connection. Not only was he a member of the Torch Relay Team in the run up to the Atlanta Games in 1996, but as a child aged just nine in Finland he was used as a translator for the USA’s women’s team during the 1952 Helsinki Games.

Currently Director of the Clinical Research Section at the Indiana University School of Dentistry, Dr. Matis has reviewed the clinical research into possible tooth damage caused by bleaching. “Most lab bench studies showed a loss of micro-hardness in teeth after bleaching, but there was no in vivo research, and in the lab there is no saliva or pellicle to protect the teeth. When we studied teeth that had been bleached in the mouth prior to extraction, we found there was no evidence of loss of micro-hardness. Clearly, the importance of in vivo research cannot be underestimated in relation to dental bleaching.”

After examining histological changes to pulp in patients who had bleached their teeth, mild pulpal changes were observed in 17 per cent of cases. These changes were insufficient to cause lasting change, suggesting that post bleaching pulpal changes are transitory.

One temporary effect experienced after tooth whitening is sensitivity. “If I could develop the tooth blanket that patients ask for, I’d make a fortune!” says Dr Matis. Sensitivity affects 50-75 per cent of whitening patients and it’s important for all involved to understand that “bleach is a concentrated chemical and results are time dependent - a higher concentration will cause more sensitivity but most sensitivities will cease once bleaching ceases.” If patients are already experiencing tooth sensitivity, it is important that the dental professional performing the procedure achieves the appropriate balance between the concentration of the whitening agent and the period of application.

A move by the US Federal Trade Commission to allow unqualified operatives to offer tooth whitening in shopping centre kiosks in the state of Georgia is causing concern to both Dr. Matis and the ADA. “I’m very afraid that if we allow unqualified people with minimal scientific information to offer dental bleaching then patients will not get accurate information on the indications and contraindications on whitening teeth.” Whether this will also be allowed in other states is not yet known.

**_author info_**

Dr. Bruce A. Matis served for 22 years in the United States Air Force, culminating as a consultant for three years to the Surgeon General of the USAF. He retired from the military in 1993 and joined the faculty of Indiana University School of Dentistry, where he is a Professor and currently Director of the Clinical Research Section.

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The ninth Clinical Innovations Conference 2012

The Clinical Innovations Conference has become a major event in the dentistry calendar. Now in its ninth year, this established event gives participants a chance to hear from world-class speakers from around the globe who will be presenting a host of lectures and live workshops. The event looks set to be inspirational and motivating for all involved.

This year the conference will be held in the Millennium Gloucester, Kensington in London Friday 18th and Saturday 19th March 2012. With a varied schedule throughout the conference, participants will have an opportunity to understand and learn how to apply the latest aesthetic developments through practical experience, and to attain treatment tips that can immediately be introduced to everyday practice.

The conference meets the GDC’s educational criteria and delegates who attend both days will gain 14 hours of verifiable CPD certified by Smile-On Ltd. The event is not just an opportunity to gain priceless experience but a chance to encounter experienced speakers. Confirmed speakers for the conference include Professor Nasser Barghi, Dr Wyman Chan, Dr Richard S Kahan and Professor Gianluca Gambarini.

Professor Barghi is head of the aesthetic dentistry division in the Department of Restorative Dentistry at the University of Texas, San Antonio. He has presented more than 650 educational courses and empiric workshops in more than 30 countries, written over 250 articles and abstracts and conducted extensive research into the bonding of new cosmetic materials and etched porcelain-bonded restorations. He is a member of the American Academies of both Esthetic Dentistry and Fixed Prosthodontics, and the International Association for Dental Research.
Dr. Chan is a teeth whitening specialist who has engaged with the entire major home and surgery whitening systems and conducted research which has led to the granting of five UK patents. Widely acknowledged as an expert in this field, by combining research with his experience of thousands of patients he has developed protocols that improve the safety, predictability and efficacy of teeth whitening procedures. A prolific author on this subject, he is responsible for a chapter in the new Quintessence manual “The Art of Treatment Planning.”

Dr. Kahan is a Harley Street specialist and the senior visiting lecturer on endodontology at the Eastman Dental Institute, UCL where he teaches postgraduate specialist students as well as GPs. A highly regarded lecturer nationwide, his other interest is dental IT integration, and he has recently created Endobiz, a clinical software programme currently undergoing beta testing.

Professor Gambarini has lectured in universities all over the world and is the author of or has contributed to 450 scientific books, articles or other publications. His special interest focuses on endodontic materials and clinical processes and he has been the keynote speaker at major national and international endodontic congresses on all five continents, including those of the AAE, IFEA and ESE. He is currently working with manufacturers in several countries to develop new technologies and clinical procedures for root canal treatment.

The AOG, founded in 1981 at the former London Hospital Medical College in Whitechapel by a group of Anglo-Asian students who wanted to share knowledge and support. They now represent one of the largest demographic communities within in the UK dental profession. The AOG are family and charity orientated, maintaining strong links with a number of charities working in Africa and India. An example is the Chikaroot Project, which provides free dental treatment to more than 500 families in the Madhya Pradesh region of India.

Apart from the opportunity to listen to experts in the field, there is a chance to debate, participate in question and answer sessions and attend the AOG Clinical Innovations Charity Ball, a great opportunity to relax and network. The AOG Clinical Innovations Charity Ball will be held on the Friday evening for the third year running. In 2011 more than 200 people attended and enjoyed a festive occasion of wonderful food and entertainment.

The Clinical Innovations Conference is always well attended. Now it is firmly established, it is valuable for dentists seeking to improve their own practice and performance. Delegates can also be kept well-informed on endodontic progress, enjoying and varied and enlightening event.

For more information and to book a place call Smile-On 020 7400 8989 or email info@smile-on.com or visit www.clinicalinnovations.co.uk.
Diary Dates

COSMETIC EVENTS UK 2012

Hands-on Inman Aligner courses
run by Dr Tif Qureshi
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Parrock Street Dental and Implant Centre
Seminars and study courses
Various Dates
Email: info@parrockstreetdental.co.uk

Inman Aligner Online Learning Course
Daily - online learning
www.straight-talks.com/cosmetic-dental-seminars

Inman Aligner Hands-on-Course
The British Dental Association
Various Dates
Visit - www.straight-talks.com/cosmetic-dental-semiars/events/calendar-of-events/

Occlusion in the Aesthetic Practice
13-14 April
Various Dates
The Hilton London Paddington Hotel
London

Inman Aligner Hands-on-Course – The British Dental Association
20 April
London

Wirral Core Curriculum Series 2012 UK
The Art & Science of Equilibrium
3-5 May
Wirral

Wirral Core Curriculum Series 2012 UK
Comprehensive Examination & Records
24-26 May
Wirral

Designing Smiles with No Preperation and Ultrathin Veneers
29 June
Schottlander, Hertfordshire

Wirral Core Curriculum Series 2012 UK
Restoring Anterior Teeth
5-7 July
Wirral

Wirral Core Curriculum Series 20121 UK
Treatment Planning Functional Aesthetic Excellence
12-14 July
Wirral

Wirral Core Curriculum Series 20121 UK
The Art & Science of Equilibrium
13-15 September
Wirral

Wirral Core Curriculum Series 20121 UK
Restoring Anterior Teeth
15-17 November
Wirral

INTERNATIONAL EVENTS 2012

Krakdent
8-10 March 2012
Cracow

Dental Expo
March 15-17, 2012
Amsterdam

The 49th EDSA (European Dental Student’s Association) Meeting
1-8 April, 2012
Thessaloniki, Greece

Dental Salon
23-26 April, 2012
Moscow
**Manufacturer’s News**

**Bitetech:**

**Making a good impression: providing performance mouthwear**

Dr Peter Fine is principal dentist of The Knoll Dental Practice in Barnet and Director of Sports Dentistry at the UCL Eastman Dental Institute. He has recently become an official provider of Under Armour Performance MouthwearTM (UAPM) from Bite Tech.

“Custom-fit mouthwear is very straightforward to incorporate into the practice,” says Dr Fine, “dentists are taking impressions every day of their lives. With UAPM, you’ve got something that fits properly, is comfortable and protects, so people are more likely to actually wear it!

“UAPM stops your teeth from coming completely together, so the muscles are ‘at rest’. This prevents the production of lactic acid, which causes fatigue, aches and pains. If muscles are more relaxed, athletes are freed up to perform better.

“To start with, I’m targeting my existing patient list, making use of the bi-annual practice newsletter and placing other literature in the waiting room. Once the service has bedded in, I’ll look further afield to spread the word.”

For more information on how your patients can benefit from Under Armour Performance MouthwearTM go to www.bitetech.com, call Nuview on 01453 872266 or email armourbite@nuview-ltd.com

**DMG:**

**Luxatemp Star - Best just got better!**

Luxatemp, DMG UK’s bisacyl composite for temporary crowns and bridges, has been the market leader in the USA for many, many years. It has received many International Awards including “Top Provisional Material 2010” from the American Dental Advisor*.

However, in Luxatemp Star, DMG UK believe they have now made the best even better!

Luxatemp Star offers improved initial hardness and outstandingly high values in flexural strength and fracture toughness, thereby delivering even greater stability and longevity. In addition, the long-term colour stability has been further optimised. Always striving for the best possible, DMG have also designed Luxatemp Star to achieve its final hardness even faster than its predecessor: in about 5 minutes. However, established valued Luxatemp characteristics such as ease of handling, colour stability and natural fluorescence remain as important as before.

For further information contact your local dental dealer or DMG Dental Products (UK) Ltd on 01656 789401, fax 01656 360100, email info@dmg-dental.co.uk or visit www.dmg-dental.com

*Rating by The Dental Advisor for Luxatemp-Fluorescence Vol. 27, No.1 Jan/Feb 2010.

**Smile Centre:**

**United Smile Centres - Keeping your patients smiling**

At United Smile Centres we use state of the art equipment to transform people’s lives with our Permanent Teeth in a Day treatment. The technique we provide is now available to patients who have previously been considered unsuitable for implant surgery. The procedure takes advantage of the dense bone in the front part of the jaw, placing implants at an angle to avoid the sinus cavities in the upper jaw and the nerve canal in the lower jaw. Your referral could change your patient’s life. One such success story is Keith Collins, a 67 year old who had battled with bad teeth all his life until he came to us:

For Keith, we provided a key alternative to traditional dentures and dental implant techniques. With your referral we can help many more people like Keith transform their lives, one smile at a time.

For more information about United Smile Centres visit www.united-smilecentres.co.uk. Call 08008494959.
The LR appliance from Oralign – simple to learn with fantastic results

The LR appliance from Oralign Ltd is one of the smallest removable orthodontic appliances currently available, and is designed specifically to achieve beautiful results, fast.

Dr Adam Precelton of A & H Dental Care, recently attended an LR Training Day held in Leeds: “I was looking for a simple, versatile yet cost-effective orthodontic appliance to use in general practice. The LR appliance seemed to fit the bill. The course was well organised with a system manual provided for the appliance. The tutors Ross and Lester were extremely enthusiastic and the teaching was easy to follow, especially for someone without previous orthodontic training.

“The huge plus with this system is that the brain-work is carried out by orthodontists, who plan the treatment and design the appliance. Knowing that a specialist has had an input into the planning is extremely reassuring for the general practitioner. The course gave me sufficient knowledge to monitor treatment myself, with the reassurance of in-treatment back up at the end of the phone. I can’t recommend the LR appliance enough!”

For clinical information please contact Dr Ross Hobson on 07710 243690 or email: ross@oralign.co.uk
For information on administration please contact Dr Lester Ellman on 07973 875 503 or email: lester@oralign.co.uk / www.oralign.co.uk

Waterpik:

Waterpik® Water Flosser

Do your patients complain that they don’t like to floss but desire better dental health? If so, consider recommending the Waterpik® Water Flosser. Studies show that it is up to two times more effective than string floss at improving gingival health.1

Dental professionals have a responsibility to ensure that patients understand the importance of daily oral healthcare, and are aware of all options available to assist them in maintaining sound dentition and gingiva, as well as overall systemic health.

In a recent survey, dentists were asked the main reason for recommending the Waterpik® Water Flosser. Here are their top responses:

• Accesses areas that a toothbrush cannot reach
• Cleans interdental spaces

• Removes pathogenic bacteria from periodontal pockets
• Reduces gingivitis
• Removes plaque biofilm

Extensive scientific evidence indicates that the Waterpik® Water Flosser represents a key component in daily self-care, offering patients a wide range of benefits, including:

• Ease of use compared to string floss
• More effective at improving gingival health and removing plaque biofilm than traditional brushing and flossing
• Versatility - suitable for a range of ages and needs, including orthodontics, implants and periodontics

Improve compliance when it comes to interproximal cleaning – give your patients a clinically proven and effective means of improving their oral health with the Waterpik® Water Flosser.

For more information on the Waterpik® Water Flosser speak to your wholesaler or visit www.waterpik.co.uk. The product is also widely available in Boots stores and selected Lloyds Pharmacies.

Dentsply:

Chemfil™ Rock from DENTSPLY - stronger and faster

The formulation of ChemFil Rock from DENTSPLY has made it a groundbreaking glass ionomer (GI) which is up to 25 per cent stronger* than other GIs. Zinc reinforced, a modified polyacrylic acid in ChemFil Rock helps the earlier build up to fracture toughness within the first few crucial hours, meaning you and your patients can be sure of longer lasting, superb quality restorations.

With just five simple steps – Activation, Mixing, Application, Packing/Excess Removal and Finishing and no need for cavity conditioning or surface coating, ChemFil Rock saves time, effort and cost.

Contact us at dentsply.co.uk or 0800 072 3313

Earn rewards against purchases at dentsplyrewards.co.uk

Access webinars and products demonstrations and earn CPD at dentsplyacademy.co.uk
submissions: formatting requirements

Please note that all the textual elements of your submission:
- the complete article,
- all the figure captions,
- the complete literature list, and
- the contact info (bio, mailing address, E-mail address, etc.)

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

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

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

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

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

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

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

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

If you need to make a list, or add footnotes or endnotes, please let the Word processing program do it for you automatically. There are menus in every program that will help you to do this. The fact is that no matter how careful one might be, errors have a way of creeping in when you try to hand number footnotes and literature lists.

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

Please put figure references in your article wherever they are appropriate, whether that is in the middle or end of a sentence. If you are not directly mentioning the figure in the body of your article, when it appears at the end of the sentence the figure reference should be enclosed within parenthesis and be inside the sentence, meaning before the fullstop.

In addition, please note:
- We require images in TIF or JPEG format.
- These images must be no smaller than 6 x 6 cm in size at 300 DPI.
- Images cannot be any smaller than 80 KB in size (or they will print the size of a postage stamp!).

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

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

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

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

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

Group Editor
Lisa Townshend
lisa@dentaltribuneuk.com
cosmetic
dentistry_beauty & science

Group Editor
Lisa Townshend
lisa@dentaltribuneuk.com
020 7400 8979

Publisher
Joe Aspis
joe@dentaltribuneuk.com
020 7400 8969

Editorial Assistant
Laura Hatton
laura.hatton@dentaltribuneuk.com
020 7400 8981

Sales Executive
Joe Ackah
joe.ackah@dentaltribuneuk.com
020 7400 8964

Design and Production
Ellen Sawle
ellen@dentaltribuneuk.com
020 7400 8921

Editorial Board

Professor Nick Grey
BDS, MDsc, PhD, DRDRCSEd, MRDRCSEd, FDSRCSed, FHEA
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