# DENTAL TRIBUNE

The World's Dental Newspaper · Middle East & Africa Edition

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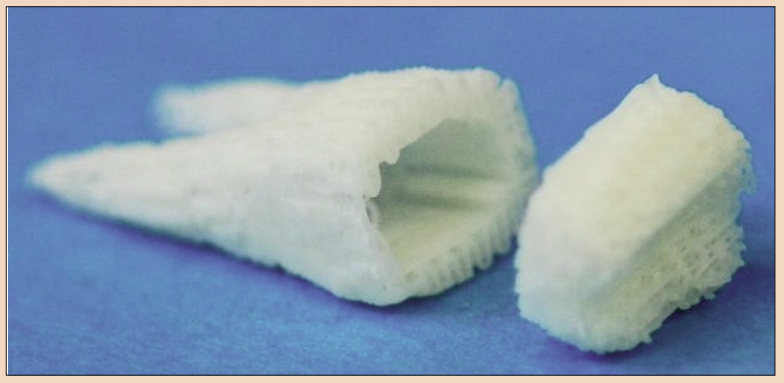
## Columbia University announces break-through in tooth regeneration

Daniel Zimmermann
DTI

NEW YORK, USA/LEIPZIG, Germany: Dental implants could soon become a secondary choice for replacing natural teeth. According to new research from the College of Dental Medicine at Columbia University in New York, three-dimensional scaffolds infused with stem cells could yield an anatomically correct tooth in as soon as nine weeks once implanted. The new technique, developed by Columbia University professor Jeremy Mao, has also shown potential to regenerate periodontal ligaments and alveolar bone, which could make way to re-grow natural teeth that fully integrate into the surrounding tissue.



Previous research on tooth regeneration has been focusing on harvesting stem cells directly on dental implants to improve osseointegration or outside the body where the tooth is grown under laboratory conditions and implanted once it has matured. Mao's technique, which has been tested on animal-models, is moving the harvesting process directly into the socket where the tooth can be grown 'orthotopically'.

→ DT page 2

## 3M ESPE new composite takes restorative dentistry to new heights

3M ESPE announced its newest universal restorative Filtek™ Z350 XT Universal Restorative, which was launched in Middle East and was supported by scientific events in Saudi Arabia, UAE, Lebanon and Kuwait . The scientific event was a great success and there was high attendance of dentists.

The scientific events held in UAE, Lebanon and Kuwait was about Conservative Esthetic Solutions. The topics which were addressed were esthetic concepts, color parameters, shade selection, finishing and polishing and post-op sensitivity. Also, scientific events showcased some innovative techniques that showed to reach aesthetic success, respecting

→ DT page 2

## Cleaning teeth twice a day can prevent heart attack

People who have poor oral hygiene have an increased risk of heart disease compared to those who brush their teeth twice a day. That's according to research published in the British Medical Journal. There has been increased interest in links between heart problems and gum disease over the past 20 years.

While it has been established that inflammation in the body (including mouth and gums) plays an important role in the build up of clogged arteries, this is the first study to investigate whether the number of times individuals brush their teeth has any bearing on the risk of developing heart disease, says the research. The authors, led by Professor Richard Watt from University College London, analysed data from more than 11,000 adults who took part in the Scottish Healthy Survey. The research team analysed data about lifestyle behaviours such as smoking, physical activity and oral health routines.

Individuals were asked how often they visited the dentist (at least once every six months, every one to two years, or rarely/never) and how often they brushed their teeth (twice a day, once a day or less than once a day). On a separate visit, nurses collected information on medical history and family history of heart disease, blood pressure and blood samples from consenting adults. The samples enabled the researchers to determine levels of inflammation that were present in the body.

The results demonstrate that oral health behaviours were generally good with six out of ten (62%) of participants saying they visit the dentist every six months and seven out ten (71%) reporting that they brush their teeth twice a day. Once the data were adjusted for established cardio risk factors such as social class, obesity, smoking and family history of heart disease, the researchers found that participants who reported less frequent toothbrushing had a 70% extra risk of heart disease compared to individuals who brushed their teeth twice a day, although the overall risk remained quite low. Professor Watt says:'Our results confirmed and further strengthened the suggested association between oral hygiene and the risk of cardiovascular disease - furthermore inflammatory markers were significantly associated with a very simple measure of poor oral health behaviour.' DT

# Did you see the STARS Twinkle in Alexandria?

*DentalXp would like to congratulate Professor ElAttar and all the AOIA Academy members for a great and successful meeting in Alexandria Egypt, in March 2010*

By all measures, figures and Statistics, the Stars meeting (AOIA 2010) was the most successful Implantology meeting the history of the Middle East and Africa

The AOIA was honored to have the brightest stars in the field of oral Implantology gathering to achieve its aim of spreading the knowledge and getting people together

The Super Star, Dr. Henry Salama, -a main member of Team Atlanta- conducted a half day course "Minimally Invasive Implants protocols and Management of risk factors in Esthetic therapy: Success by design" which received a magnificent applaud by the attendants who reached 2000 registrations on the first day.

me feel like part of the family."

The Congress was also enlightened by the presence of Dr Kenneth Judy the ICOI co-founder & co chairman, Dr Morton Perel the chief editor of Implant Dentistry journal, ICOI & Mr. Craig Johnson

the ICOI Executive Director coming specially to reward our fellowship recipients.

The scientific program hosted other stars like Dr Gerald A.Niznick, Prof Nabil Barakat, Dr Mohamed Hassan, Prof dr Ates Parlar, Dr Nadim Aboujouade, Prof Ahmed El Serafi, Dr Nik Sisodia, and many others..

*Dr Henry Salama: "I would like to personally thank all those who made*

To continue their leadership, the AOIA hosted the ICOI fellowship rewards ceremony, which was held on 24th March during the Gala Dinner in Crystal palace where 26 dentists received their ICOI fellowships & masterships.

Whether you were there or not, don't miss the coming event. Mark your calendar for the AOIA 2012 great event: Stars Beyond the Horizon. April 25-27, 2012 DT


← DT Page 1

"A key consideration in tooth regeneration is finding a cost-effective approach that can translate into therapies for patients who cannot afford or who aren't good candidates for dental implants," Dr Mao told Dental Tribune Asia Pacific. "Our findings represent the first report of regeneration of anatomically shaped tooth-like structures in vivo."

Dr Mao's study has been published in the recent Journal of Dental Research and will be presented at this year's International Association of Dental Research congress in Barcelona. Columbia has also announced to have filed patient applications in relation to the engineered tooth and is actively seeking partners to help commercialise the technology through its technology transfer office Columbia Technology Ventures. DT

← DT Page 1

periodontal and dental tissues. It was conducted by Prof. Angelo Putignano a professor in restorative dentistry and the head of operative dentistry and endodontic department at the University of Marche – Ancona – Italy. He is the co-author of the book "Adhesive dentistry: the key to success". It was his first visit in Middle East.

While in Saudi Arabia, Dr Rachdan was speaking about Latest Advancements In Restorative Dentistry, classifications of bonding systems, compared the advantages and disadvantages of Total etch Vs Self etch adhesives, the features of nanocomposites and the use of the layering technique for the challenging anterior cases

Filtek Z350 XT universal restorative delivers even better esthetic qualities through an expanded range of body shades. This offers more universal options for creating easy, natural-looking, one-shade restorations, while maintaining the composite's versatility for dual or multi-layering techniques (four opacities are available). Additional advancements include improved polish retention of dentin, body and enamel shades, as well as improved handling of translucent shades. Beyond the product attributes, additional simplification is seen in the form of new, bold labeling and

color-coded opacities, which simplify the shade selection process.

"Feedback from dental professionals is at the core of 3M ESPE innovation, and it's what allows us to take industry-leading composite technology and make it even better," said Dr. Samer Aouad, Scientific Marketing Supervisor-3M ESPE - Middle East and Africa who was also present in the scientific event.

"With Filtek Z350 XT, we've modified the technology to maintain the excellent handling dentists love while improving upon polish retention and simplifying the shading system."

As the first and only composite system to incorporate true nanotechnology, the Filtek line has gained a strong following over the past six years for its ability to provide the polish and polish retention of a microfill, while maintaining the strength and wear properties of a modern hybrid. DT



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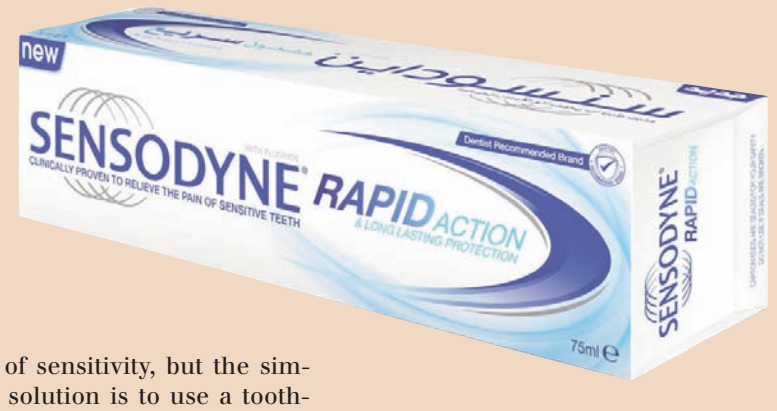
# New Sensodyne Rapid Action provides clinically proven relief for sensitive teeth




**GlaxoSmithKline (GSK) announced the Middle East launch of Sensodyne Rapid Action. The new toothpaste provides an answer for the large number of people who suffer from sensitive teeth but do not treat the problem. In response, fast-acting Sensodyne Rapid Action works in just 60 seconds and offers long-lasting protection.**

Tooth sensitivity is a common problem affecting 1 out of 3 consumers, yet many do not actively address the problem. A large number of sufferers try to ignore their sensitive teeth or develop ways to avoid the pain, for example, by changing the way they consume certain food and drinks or avoiding them altogether. Also, some people choose to ignore this problem since they have a hectic lifestyle and do not have the time to look for a solution.

For those sensitivity sufferers looking for a quick and easy solution, the new Sensodyne Rapid Action can be massaged directly onto the exposed sensitive dentine for sixty seconds, and hence provide rapid relief from the pain of sensitive teeth. Plus, Sensodyne Rapid Action provides the benefits of an ordinary daily toothpaste including all-round protection, cleaning and freshness.

Mohammad Otaibi, Group Brand Manager GSK Consumer HealthCare, said, "Sensitive teeth can start in late teens and – if untreated – can infringe the enjoyment of certain food and drinks. That is why people adopt all sorts of behaviors to avoid the pain of sensitivity, but the simplest solution is to use a toothpaste that is specially designed for sensitive teeth. The new Sensodyne Rapid Action provides a physical seal against sensitivity triggers and, used twice daily, it provides long-lasting protection from sensitivity."

Sensodyne Rapid Action can be bought at major supermarkets and pharmacies across the region. To find out more about Sensitive teeth and Sensodyne Rapid Action talk to your dentists.

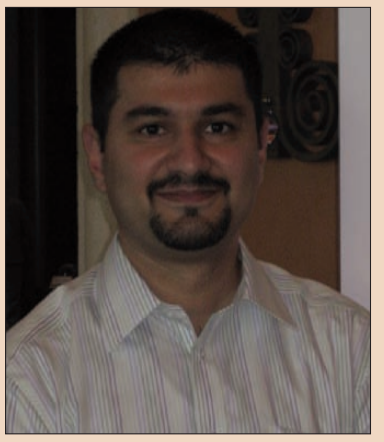

# THE EVENT

**Dubai hosts for the 4th time the CAD/CAM & Computerized Dentistry International Conference organized by Emirates Dental association and Centre for Advanced Professional Practices (CAPP).**

The annual conference was a great success and achieved record attendance further establishing our reputation as the industry's leading CAD/CAM scientific Conference.

This year's agenda offered a wide variety of topics and it is clear from the participant's feedback that the sessions they attended were greatly appreciated. All sessions were very well attended. This was not only due to the quality of input from the speakers and panelists but also due to the richness and pertinence of the discussions.

# 3M Incognito Certification Course, Dubai March



Recently in Dubai, at The Atlantis Hotel Palm Jumeirah, 3M hosted an Incognito Certification Course with up to 50 Orthodontists from across the Middle East region.

Dima Zein, Business Development Manager of 3M™Unitek™ in Middle East & Africa says, "Those patients that rejected orthodontic treatment for aesthetic reasons in the past can now reconsider thanks to the new technology and - if we judge by the significant up-take of Incognito based on sales – consumers are responding well. With the growing level of adult interest in aesthetics, we expect even more focus on the Incognito™ Lingual System by orthodontists, as they respond to this consumer demand."

The patented manufacturing process of the Incognito™ system guarantees a remarkable flat design and as a result, offers patients seeking straighter teeth and effective treatment and maximum comfort.

The new Incognito™ Bracket System is based on digital registration of the malocclusion situation. The brackets are then individually designed and optimally positioned in the computer. State-of-the-art Rapid Prototyping technology is used for the actual manufacturing of lingual brackets. The single production stages are illustrated and described in the category production.

**Interview with Dr. Khaled A. Al-Khayat, D.D.S., M.S. Assistant Professor Orthodontist**

1) Why do you think that 3M's Incognito treatment is such a beneficial treatment to use at your practice?

The Incognito treatment is very beneficial treatment, not only for my practice but also for my patients both in the short and long-term. The biggest advantage is that this treatment is custom-made for each individual, chair time is reduced and the whole treatment is much more efficient in its design and application. I have actually had patients come in and ask me if we could provide the Incognito treatment, which just goes to show how good this treatment actually is.

2) Please can you tell me a bit about the 3M products you have used in your practice and how you think they have fared?

Up until now I have been using the Clarity SL treatment which has seen some very good results, and is very beneficial in the sense that it doesn't stain as much as other braces, and is much more aesthetically pleasing due to its smaller size. Again, chair time is greatly reduced with Clarity SL.

3) Have you seen an increase in adults receiving orthodontist treatments to achieve that 'Perfect Smile', and if so why do you think that is?

There has always been demand for orthodontic treatment among adults, but this trend has most definitely increased over the last 15 to 20 years. This is due to more and more people wanting to emulate celebrities, and get that 'Hollywood Smile'. With a product like Incognito, which is a lingual treatment, it is now much easier and more acceptable for adults to receive the treatment.

**Interview with Jean-Stephane Simon, Clinical Director – Lingual Certificate University of Paris, Speaker at the certification course.**

1) Why is it so important for orthodontists form the region to complete this course?

It is really important because this is the only customized treatment in the world; there is nothing else like it which exists. Therefore it is vital that orthodontists are trained to be able to use the treatment in the most effective way possible.

2) Do you think that through hosting these workshops you will raise awareness of the Incognito brand?

Yes, we have definitely seen an increase in the number of people worldwide who are asking about Incognito. Once orthodontists know about the great benefits of this treatment, then of course they will want a bit of the action.

3) Can you tell me about why you work with 3M and what Incognito's story is?

In 2002 Incognito was tested on its first patient, and the treatment was then on the market by 2004. Up to 500 custom-made Incognito braces are built every week, all over the world (apart from the US).


# Getting to know you

## A detailed history is an essential element in understanding the background to a patient's oral health and planning effectively for their present and future treatment - Dental Protection

Before providing any treatment, it is a clinician's responsibility to ask the right questions, in the right way, and to listen carefully to the patient's responses. If an important aspect of a patient's history does not come to light in the consultation process, and problems arise as a result of this, attention tends to focus upon the clinical records and what they do (and do not) contain. In the absence of any evidence that certain key questions were ever asked, it is extremely difficult to demonstrate at a later date that they were.

If, on the other hand, there is a clear answer – perhaps in a medical history questionnaire which has been completed (and preferably, signed and dated) by the patient on a particular day, then there can be no doubt that the clinician asked the relevant question and was entitled to work from the assumption that the answer(s) given were correct.

Four specific areas of the patient's history are worthy of particular consideration in this brief overview: -

- Medical history
- Dental history
- Personal/social history
- History of the presenting complaint (if any)

**General observations**
Creating any history about a patient is essentially an information gathering exercise. Specific techniques can usefully be employed to maximise the effectiveness of the process. The experienced clinician will choose between the available techniques according to the communication abilities of the individual patient that they are dealing with.

**Closed questions**
There are times when you need a definite 'yes' or 'no' answer to a specific question. The first stage of medical history screening may be one such occasion. Such questions are sometimes called 'closed' questions because there is little or no opportunity to obtain a more detailed reply from the patient. A direct 'yes' or 'no' is exactly what you are looking for. Closed questions can also be useful when dealing with patients whose answers tend to stray from the purpose of the question.

**Open questions**
These questions tend to begin with… What? Why? When? How? etc and because of this, they require the patient to provide more information for you in their reply. This is often helpful when dealing with less communicative patients, or when you are hoping to gather information of a better quality, and in greater detail.

**'Why' questions**
These questions, which are a specific kind of open question, can be extremely useful. They

**'Shopping list' questions**
This approach is a little like a multiple-choice test, where you give the patient several possible answers to choose from. For example 'What makes the pain worse?... is it hot things?... or cold things?... or biting on the tooth?'... and so on. They can be useful when dealing with patients who seem not to understand the meaning of open questions and can thereby speed up the information gathering process.

**Leading questions**
These questions tend to be worded in such a way as either to suggest the answer or to invite a specific reply. For example 'You have been wearing your appliance, haven't you?' They can be useful when trying to establish confidence and communication with a nervous, quiet, or uncommunicative patient but are of limited value when seeking specific accurate information, or a more detailed reply.

**Medical history**
One of the first principles one learns at dental school is that of the importance of taking a detailed medical history before treating any patient. Most dental schools have their own design of medical history questionnaire, and this shapes the format, style and extent of any further questioning of the patient on particular points arising from the medical history.

Many practices, in similar fashion, take commendable care in designing and using their own medical history questionnaires which patients are asked to complete when attending the practice for the first time. In most cases the design provides for the patient to answer 'yes' or 'no', to a set of specific predetermined questions, and then to sign and date the completed questionnaire. The dental surgeon then ensures that the patient has properly understood all of the questions (for example, where patients leave one or more answers blank), and where 'yes' answers have been given, further questioning of the patient will allow the details of any response to be clarified and expanded upon. Sometimes this highlights areas where further information needs to be gathered – perhaps by contacting the patient's medical practitioner, perhaps by asking the patient to bring any medication they are taking along to the next visit, so that the precise drugs and dosages can be identified with certainty.

In several recent cases, the patient's medical history has been at the heart of negligence claims brought against dentists and other dental team members. It is crucially important, for example, to investigate the nature of heart murmurs, or other functional heart disease, in order to decide whether prophylactic antibiotics are indicated to prevent the risk of infective endocarditis. Infective endocarditis is a serious and life-threatening disease, and most patients are left with permanent damage which has the potential to shorten their life and/or restrict its quality. Damages in such cases are therefore very high indeed, often including a lifetime's loss of earnings.

Other recent cases have involved, for example, a failure to take into account certain allergies to drugs (especially penicillin and other antibiotics), or to recognise the significance of long-term aspirin medication predisposing to postoperative bleedings, or to recognise the potential for drug interactions.

Cases such as these often reveal the fact that although a practitioner might have taken a comprehensive medical history when the patient first attended as a new patient, this process has either not been repeated, or has been much more superficial, when the patient has returned for successive courses of treatment. In the majority of cases, no further written medical history questionnaire is ever undertaken, and indeed there is rarely any note on the record card to confirm what (if any) further questioning has taken place to update the patient's medical history. This can be a considerable embarrassment when the patient has attended the same practice over a large number of years, and the practitioner is apparently still relying upon the patient's original medical history details.

It is self-evident that a patient's medical status is not static, and indeed, a patient's medication prescribed by others may change from visit to visit – it is prudent, therefore, to ensure not only that changes in medical history (including medication) are regularly checked and updated, but also that this fact is clearly recorded as a dated entry in the patient's clinical notes.

*'Any clinical examination is still only a snapshot of a patient's dental and oral tissues at a moment in time'*

Many practices take medical histories verbally and if no positive or significant responses are elicited, an entry such as 'MH – nil' is made in the records. While better than nothing at all, this approach carries the disadvantage that it can be difficult or impossible to establish precisely what questions were asked of the patient, in what terms, and what answers were given. Clearly, a well structured medical history questionnaire form, which is completed, signed and dated by the patient, and subsequently updated on a regular basis (ideally, during each successive course of treatment), is not only in the patient's best interest, but is also the best platform for the successful defence of cases where failure to elicit or act upon a relevant aspect of medical history leads to avoidable harm to the patient.

In all cases, the taking and confirmation of a medical history is the role of the dental surgeon and is certainly a key part of a dentist's duty of care. If in doubt, it may be sensible to defer treatment pending clarification of any areas of uncertainty in a patient's medical history.

**Dental history**
However thoroughly it is carried out, any clinical examination is still only a snapshot of a patient's dental and oral tissues at a moment in time. While it will provide a lot of useful basic information, the clinician's understanding of the patient's presenting condition is greatly improved by knowing how the patient reached the present position.

- Is the patient a regular or irregular attender?
- What treatment has been provided in the last five years?
- Is there a history of fractured teeth/fillings?
- Are any teeth painful or sensitive?
- If so, what causes any such sensitivity?
- Do the patient's gums bleed on tooth brushing or spontaneously?
- Is the patient apprehensive about receiving dental care?
- If so, do these concerns relate to any particular dental procedure(s) or to the experience in general?
- Has the patient experienced any particular problems associated with treatment provided for them in the past? If so, what?

Not only will questions like those above help to inform the clinician regarding areas which may or may not need treatment, or which should be kept under review, they will also guide the clinician regarding the success (or failure) of treatment approaches that have been tried in the past. If this knowledge helps the clinician to avoid repeating the previous mistakes of other clinicians, it can also help to avoid claims and complaints that might otherwise have resulted.

**Social history**
The social history should include details of employment (and interests, hobbies, etc) as well as other social and family related information. The patient's occupation should be included in the consideration of relevant factors affecting diagnosis, treatment planning, consent and treatment, bearing in mind the fact that this is an aspect of a patient's history that may change as time passes. It is worth establishing a routine of checking the patient's contact details and employment, when carrying out a periodic update of the patient's medical history.

The ability to attend for appointments could affect the success of complex or extensive treatment, eg crown and bridgework, implants, long term periodontal treatment and orthodontics. Certain occupations can place severe constraints on a patient's ability to attend regularly for appointments.

Issues relating to a patients employment or recreational interests have also been known to have an impact on treatment:

For example:
- Bruxism in air traffic controllers, marathon runners and certain other sports players

• Aerodontalgia in (pilots and cabin crew)
• Stress and its relation to periodontal disease (including episodes of pericoronitis involving young adults in the armed forces, or studying for examinations)

The outcome of treatment can have a general effect or a more specific effect on a given patient. For example, chronic severe pain, which can arise from some form of nerve damage, or TMJ/muscle disturbance associated with dental procedures, or perhaps a facial paralysis, or permanent loss of sensation in the lip or tongue, would all be likely to reduce the quality of life for most patients.

On the other hand, the loss of ability to articulate clearly when speaking or singing, because of a change in anterior tooth shape, position or angulation, or perhaps because of lingual or inferior alveolar nerve damage, would have a more profound affect on an opera singer, lecturer or telephonist than for an agricultural worker who did not depend upon singing for his livelihood. Similarly, there are many jobs in which appearance is important and an adversely altered appearance can either lose a patient a job or severely affect a patient's confidence, particularly if they have to face the public in their working life. Awareness of information such as this is critical when contemplating any aesthetic/ cosmetic procedures.

**History of present complaint**
When a patient attends with a specific problem it is helpful to know how long the problem has existed, when it was first noticed, whether it has ever occurred before, whether any previous treatment has sought to resolve the problem and if so, with what success.

If the patient is complaining of pain, for example, it is helpful to know what kind of pain it is (dull ache, or throbbing, or acute bursts of pain), or how long it lasts, and what makes it worse or better and whether it has occurred previously and if so under what circumstances.

Each of these findings needs to be recorded carefully in the notes to demonstrate this important part of the diagnostic process. The significance of this becomes apparent on occasions when a mistaken diagnosis is made. If, however, the diagnosis is supported by the information which was available to the clinician at the time, as noted in the records, such situations can often be defended successfully.

**Summary**
It will be appreciated that there is very little value in gathering information from the above sources if the responses are not collected and recorded in a clear and logical fashion. Having a structured and systematic approach to history taking and record keeping makes it less likely that critical information will be overlooked, or lost.

Later in the treatment planning process, when it becomes a little clearer what treatment possibilities are under consideration, it may be necessary to explore some aspects of the history in greater depth, in order to ensure that the patient is aware of any way in which their treatment (and its prognosis) might be affected by some aspect of their history. DT

**Contact Information**
Dental Protection is the world's largest specialist provider of dental professional indemnity and risk management for the whole dental team. The articles in this series are based upon Dental Protection's 100 years of experience, currently handling more than 8,000 cases for over 48,000 members in 70 Countries. Email querydent@mps.org.uk or visit www.dentalprotection.org.

**The article has been accredited by Health Authority - Abu Dhabi as having educational content and is acceptable for up to 2 (Category 1) credit hours.**
*Credit may be claimed for one year from the date of subscription.*

## MEDIA CME Self-Instruction Program

Dental Tribune Middle East & Africa in collaboration with CAPP introduce to the market the new project mCME - Self Instruction Program.
mCME gives you the opportunity to have a quick and easy way to meet your continuing education needs.
mCME offers you the flexibility to work at your own pace through the material from any location at any time. The content is international, drawn from the upper echelon of dental medicine, but also presents a regional outlook in terms of perspective and subject matter.

**How can professionals enroll?**
They can either sign up for a one-year (10 exercises) by subscription for the magazine for one year ($65) or pay ($20) per article. After the payment, participants will receive their membership number and will be able to attend to the program.

**How to earn CME credits?**
Once the reader attends the distance-learning program, he/she can earn credits in three easy steps:
1. Read the articles.
2. Take the exercises
3. Fill in the Questionnaire and Submit the answers by Fax (+971 4 36868883) or

**Email :info@cappmea.com**
After submission of the answers, (name and membership number must be included for processing) they will receive the Certificate with unique ID Number within 48 to 72hours.
Articles and Questionnaires will be available in the website after the publication.
***www.cappmea.com***

# PROSTHODONTICS

**Prosthodontics is a specialty of dentistry that involves the restoration of damaged teeth and the replacement of missing teeth with artificial substitutes. The prosthodontist is the expert in improving the patient's smile while restoring function. Prosthodontists receive 3 years of full-time formal education after dental school to become specialists. The prosthodontist uses a variety of materials and methods when restoring and replacing teeth.**

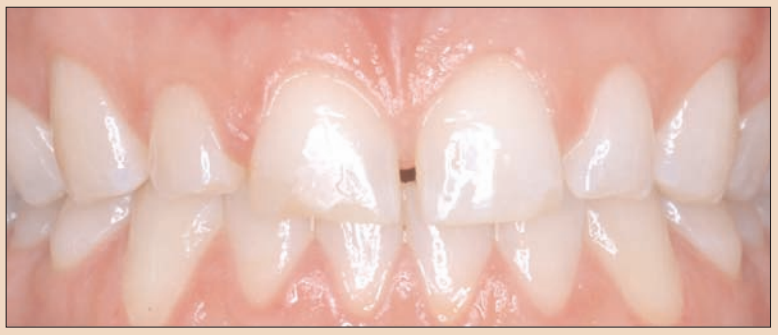


*Fig 1 A, Discolored teeth with structural defects.*

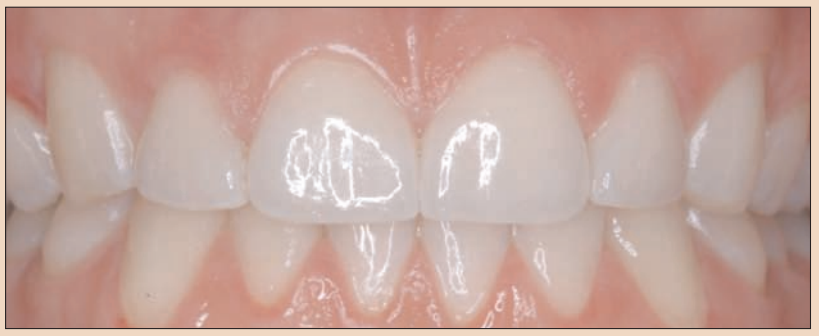


*Fig. 1 B, Finished result. Note that the spaces between the teeth have been closed with the veneers.*

## Porcelain laminate veneers

Discolored teeth or teeth with minor structural defects can be restored with porcelain laminate veneers. Veneers are very thin porcelain restorations that are bonded to the teeth. Well made and well placed veneers can be strikingly beautiful (Fig 1).

## Porcelain inlays and onlays

Posterior teeth with large cavities or old defective restorations can be restored with porcelain inlays (restorations that fit within the tooth structure) or onlays (restorations that cover one or more cusps of the teeth). These restorations can be handmade by a technician or milled with computer-assisted design/computer assisted machining (CAD/CAM) technology. The inlay or onlay is then bonded to the tooth structure (Fig. 2).

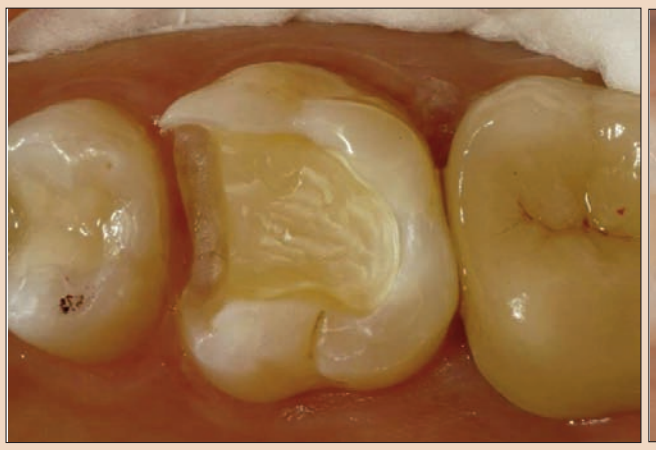


*Fig. 2 B, Molar with large cavity prepared for porcelain inlay.*

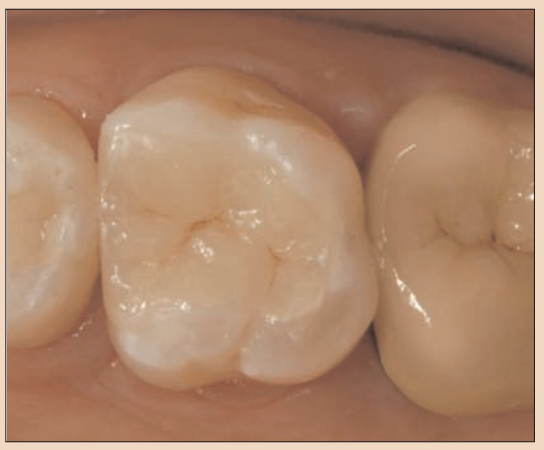


*Fig. 2 B, Bonded porcelain inlay.*

## Crowns and bridges

There are many systems for making crowns and bridges. A very popular system uses zirconia as a substructure. Zirconia is a very hard and strong ceramic material that is resistant to cracking. The substructure is milled with the use of CAD/CAM technology, and a technician places the esthetic veneering porcelain over the zirconia substructure to develop the final esthetic result (Figs. 3 & 4). All-ceramic crowns and bridges are not as strong as porcelain-fused-to-metal restorations.

## Dental implants

Dental implants can be placed in the jaw bone to support artificial teeth. Once the bone heals around the implant (2-4 months), an abutment is attached to the implant and a crown is cemented over the abutment. These implant-supported crowns can be indistinguishable from natural teeth (Fig. 5).

Implants can also be used to retain and support removable dentures. The number of implants required depends on the desired support and retention (Figs. 6)

## Summary

Prosthodontics is a complex specialty that requires extensive training and education after graduation from dental school. The prosthodontist can rehabilitate a patient's mouth to enhance esthetics and function by using various materials and techniques. Modern approaches to prosthodontics include CAD/CAM technology and dental implants. At Boston University we provide state-of-the-art prosthodontic care, including porcelain laminate veneers, porcelain inlays and onlays, all-ceramic crowns and bridges, porcelain-fused-to metal crowns and bridges, and prostheses supported and retained by dental implants.



## About the author

Dr. Morgano received his bachelor's degree in Biology from Merrimack College and his DMD degree from Tufts University School of Dental Medicine in Boston and received his specialty certificate in prosthodontics from the Hines Veterans Affairs Medical Center in the US. In addition, he is a diplomat of the American Board of Prosthodontics.
Dr. Morgano is Professor of Restorative Sciences and Biomaterials at Boston University Goldman School of Dental Medicine in Boston, and has served as Director of the Division of Postdoctoral Prosthodontics since 1996. He is on a leave of absence from the Goldman School of Dental Medicine to serve as the Chief Academic Officer/Chief Executive Officer and Director of the Postdoctoral Program in Prosthodontics at Boston University Institute of Dental Research & Education—Dubai.
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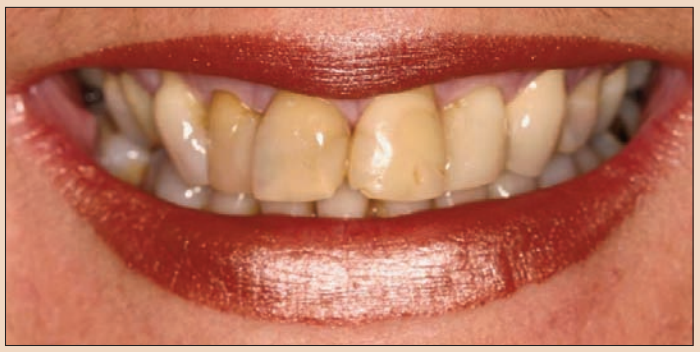

*Fig 3 A, Teeth before placement of all-ceramic crowns.*

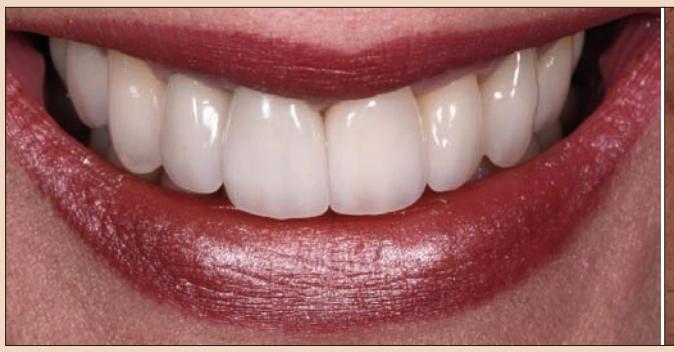

*Fig 3 B, Teeth with all-ceramic crowns in place.*

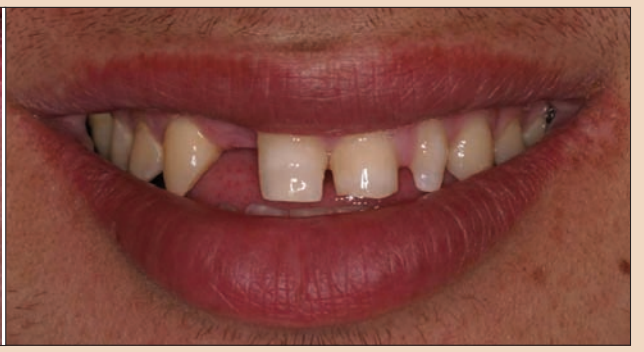

*Fig 4 A, Teeth before placement of all-ceramic bridge and three all-ceramic crowns.*

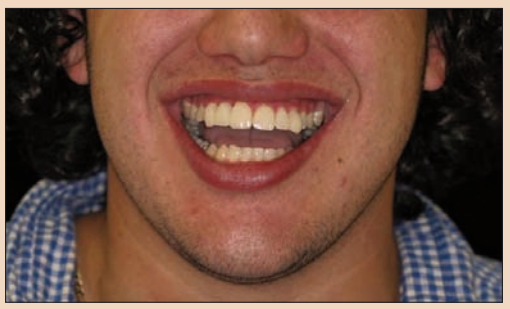

*Fig 4 B, Finished result.*

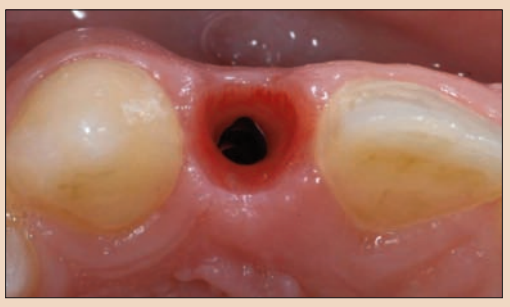

*Fig 5 A, An implant has been placed beneath the gum and in the bone to replace the missing right lateral incisor tooth.*

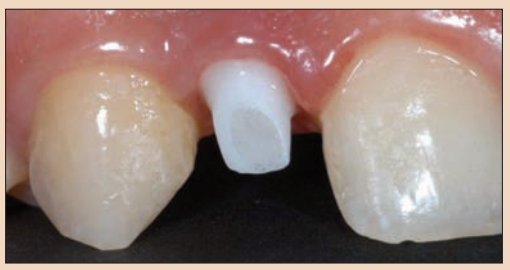

*Fig. 5 B, A zirconia abutment has been attached to the implant with a screw*

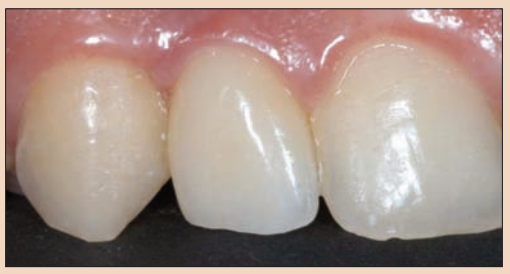

*Fig. 5 C, An all-ceramic crown has been cemented over the abutment.*

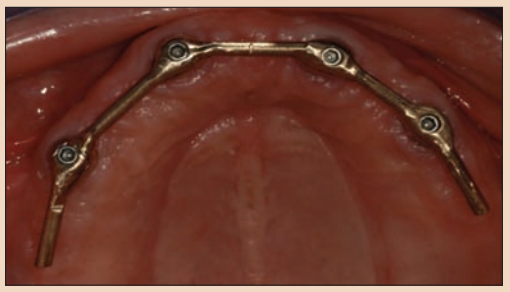

*Fig. 8 A, Bar retained by 4 implants provides retention and support for upper complete denture.*

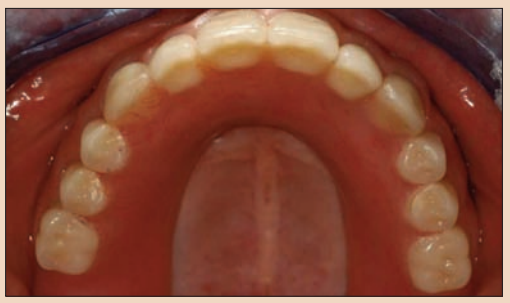

*Fig. 8 B, Denture placed over bar retainer.*