Staining susceptibility tested

By DTI

BANGKOK, Thailand/TOKYO, Japan: With the development of new materials and technology in dentistry, expectations for durable and aesthetically pleasing restorations are ever increasing. In a recent study, researchers from Thailand and Japan investigated how sensitive various restorative materials were to discoloration from coffee.

Just like natural teeth, restorative materials are susceptible to discoloration from certain foods and beverages with high staining properties, including coffee, tea and red wine. In order to avoid discoloration over time, surface quality is thus essential for the success of restorative treatments.

New CAD/CAM composite resin blocks are industrially polymerised under standardised parameters at high temperature and pressure to achieve optimum properties at the microstructural level and a high degree of conversion. As a result, material characteristics have improved compared with direct restorative composite resin.

In the study, researchers from the Tokyo Medical and Dental University in Japan and the Chulalongkorn University in Bangkok aimed to evaluate how modern composite resin block materials developed for CAD/CAM systems react to coffee exposure compared with conventional resin materials.

The researchers measured the change in colour in eight CAD/CAM blocks, including five composite resin blocks (Block HC, SHOFU; CERASMART; GC; GRADIA Block, GC; K2R-CAD Hybrid Resin Block, Yamamoto Precious Metal; Lava Ultimate, 3M ESPE), one hybrid ceramic block (VITA ENHANCE, VITA Zahnfabrik), one PMMA block (Teilo-CAD, Ivoclar Vivadent) and one feldspathic ceramic block (VITAROCKS Mark II, VITA Zahnfabrik), and four conventional composite resins.

Artificial enamel

Aiming to create a material that is able to withstand repeated stresses, such as unavoidable vibrations like those on airplanes, which cause objects with rigid structures to age and crack, researchers at the University of Michigan in the US have mimicked the structure of tooth enamel. They replicated the material by sequential growth of zinc oxide nanowire carpets, followed by layer-by-layer deposition of a polymeric matrix around these. Using computer modelling, the researchers confirmed that the structure of the synthetic enamel acted like natural enamel, diffusing the forces from vibrations through the interaction between the nanowires and polymer. Despite these positive results, automation of the production of the material will be challenging, they said.

Detecting bacteria

LONDON, UK: A new method of detecting bacteria during root canal therapy could eradicate the need for follow-up appointments and prevent treatment failure, according to a new study. The SafeRoot device, created by a team of researchers at King’s College London Dental Institute, enables rapid bacterial detection inside the root canal through fluorescent staining and microscopy, ensuring the procedure has been successful and reducing the need for tooth extraction or surgical intervention. During trials, the research team was able to successfully detect bacterial cells after just 3 minutes of testing.

“SafeRoot will reduce the time for root canal completion and will increase the success rate of treatments by letting the dentist know when it’s safe to proceed with filling the tooth,” said Professor of Biomaterials and Restorative Dentistry Tim Watson from the Dental Institute.

Higher tooth loss risk

Elderly Japanese residents who were forced out of their homes by the 2011 earthquake and tsunami disaster may be at greater risk of tooth loss, a survey by Tohoku University has found. Factors negatively affecting dental health were stress, financial problems, dietary changes and a lack of opportunities to brush teeth, it found.

Dental care in MS patients

Researchers from Queensland have found that most multiple sclerosis patients perceived dental care in Australia as inflexible and not tailored to individual experiences of the disease. Among other problems, patients reported experiencing difficulties accessing dental care, including transport and financial barriers.
Survey: Misconceptions about oral health practices revealed

By DTI

GENEA, Switzerland: The results of an online survey, carried out in 12 countries for World Oral Health Day (WOHD) among 12,849 adults, have indicated a significant gap between what people believe to be good dental hygiene habits versus what they actually do and what is recommended by oral health experts.

In eight of the countries surveyed, 30 per cent or more of the respondents said they thought it is important to brush one’s teeth straight after every main meal. This incorrect oral health practice was worst in Brazil, Mexico, Egypt and Poland (44, 40, 45 and 46 per cent, respectively). FDI recommends waiting at least 30 minutes after eating to avoid weakening tooth enamel.

“These survey results highlight an alarming discrepancy between knowledge and actual good oral health practices,” said FDI President Dr Patrick Hespe. “We want everyone to take control of their oral health this World Oral Health Day and understand that by adopting good oral hygiene habits, avoiding risk factors and having a regular dental check-up, they can help protect their mouths. A healthy mouth allows us to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotions with confidence and without pain,”

Once a day after one day, one week and one month. The results showed that the coffee solution significantly darkened all of the discs over time; however, CAD/CAM materials were generally less affected than the conventional resin materials.

After one month, the change in colour of the CAD/CAM composite resin blocks and restorative composites ranged from 1.6 to 3.2 and from 2.1 to 7.9, respectively. According to the researchers, only one material, Durafill V5, was not significantly more discoloured after one month than after one day.

However, in testing whether the coffee stains were removable through polishing, the colour of all of the materials, except for the GRADIA block, was restored after polishing with prophylaxis paste for 20 seconds. Of the conventional composite resins, Durafill and Filtek Supreme Ultra still showed some noticeable discoloration after polishing.

The authors noted that, owing to the study’s in vitro design, it is unknown how external factors, including regular toothbrushing, might affect the long-term discolouration of the materials used in patients. They further pointed out that one month of immersion might have exaggerated the results because what would be seen in vivo, as immersing materials in coffee for one week is the equivalent of about seven months of coffee drinking.

The study, titled “Discoloration of various CAD/CAM blocks after immersion in coffee,” was published in the February issue of the Restorative Dentistry and Endodontics journal.

By DTI

Dentistry and Endodontics

The majority of respondents surveyed incorrectly believed that rinsing one’s mouth with water after brushing is important.

‘These results highlight an alarming discrepancy between knowledge and actual good oral health practices.”
Australian Child Dental Benefits Schedule remains unchanged

By DTI

Canberra, Australia: Amid fierce criticism from dental groups and the opposition, the Australian government has decided to retain the Child Dental Benefits Schedule (CDBS) at its full rebate amount of A$1,000. Initially, the government planned to terminate the scheme completely according to the 2016–17 budget released last May. In December, it then announced that the scheme was to be saved, but with a watered-down amount of A$700 available per child—both proposals have now been abandoned.

The CDBS, which was introduced by the former Labor Party government and commenced in January 2014, allows low-income families to claim a rebate of up to A$1,000 per child every two years for dental care. However, at about A$312 on average, most families claimed less than a third of the full rebate in the past. “In light of this, the Government had previously set the cap at A$700 per child over a two-year period, which would still allow children to visit a dentist regularly,” Minister for Health Greg Hunt said previously in a statement.

However, after both Labor and the Greens indicated that they would veto the change in the Senate, Hunt announced the reinstatement of the full rebate just hours before the motions were to be voted on in February. According to Hunt, the decision followed consultation with the Australian Dental Association.

Commenting on the move, Australian Dental Association Vice President Dr Carmelo Bonanno said it was a common sense decision by the government. “The reduction of A$700 meant that about 20 per cent of children were going to miss out if they were going to try and utilise the scheme fully,” Bonanno told ABC News.

Regarding the low amount claimed on average in the past, Bonanno reasoned this could be attributed to a lack of awareness of the scheme. “Improving people’s awareness of that means that there’ll be better utilisation of the scheme and the outcomes are going to be far better,” he said, adding that the dental association had already discussed the need for better marketing of the scheme with the government.

Estimating general dental care costs, the Australian Healthcare and Hospitals Association calculated that children with the top 10 per cent highest need would be likely to require up to A$2,050 worth of dental work over two years and children at moderate risk would need up to A$1,233 worth of work. Keeping the scheme at A$1,000 would therefore help parents to continue to provide much-needed dental health care for their children, rather than delay treatment because of a lack of money, the association stated.

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“The market is going through a stage of consolidation”

An interview with Huub van Esbroeck, co-founder of 3-D printing solutions provider Structo

By Kristin Hübner, DTI

Singapore-based dental solutions provider Structo has the mission of empowering businesses with its application-specific digital solutions. Just recently, it helped one of Singapore’s leading dental consortia, FDC, a service provider with 21 clinics in the city-state, to launch their own facility. By managing the process itself, FDC realised that it had the opportunity to start managing the entire manufacturing line of AAA Aligners.

Dental Tribune: What exactly are AAA Aligners, and what are the benefits of the solution compared with competing products?

Huub van Esbroeck: AAA Aligners offer an affordable alternative to other clear aligner treatments. These savings are then passed to the end user, making clear aligner treatment more accessible to a larger demographic, which will soon be expanded regionally.

Can you describe the role of Structo’s technology in the development of AAA Aligners?

Dr Nurul Aizat, who is CIO and Group Clinical Director of FDC, approached Structo with a problem: the high costs of relying on an external manufacturer for its aligner cases. With the increasing volume of cases from all of its 21 clinics, FDC realised that it had the opportunity to start managing the entire manufacturing process itself to reduce manufacturing costs.

Together, we embarked on this project, which resulted in Structo assisting FDC to set up its entire digital chain, including the purchase of an intra-oral scanner, treatment planning software, Structo’s dental 3-D printer and thermoforming equipment, as well as staff training. The Structo Orthoform’s high throughput—30 models can be fabricated in 15 hours—translated to FDC only needing one printer for the entire manufacturing line of AAA Aligners.

How is the manufacturing process streamlined at the FDC clinic?

Instead of relying on an external aligner manufacturer or a dental laboratory, FDC now has a clear aligner manufacturing line in its own facility. By managing the manufacturing process itself, FDC can now eliminate the bottlenecks of working with external manufacturers, for example the lead time being determined by an external party, such as a laboratory that serves multiple customers other than FDC. By managing the process itself, FDC has halved the turnaround time from one month to only two weeks upon receiving a case, giving it an edge over its competitors.

Do you think this kind of collaboration can be applied in other areas of dentistry as well?

Collaborations such as these can be extended to any form of appliance manufacture. We have observed that the market is going through a stage of consolidation, and as a result, we are witnessing the emergence of more corporate dental service groups such as FDC. These groups would have tremendously higher volumes compared with individual practices. When these volumes hit a critical mass, these groups should and will eventually start looking at insourcing their manufacturing processes to better manage their costs through economies of scale.

Does Structo have plans to venture into other businesses or regions any time soon?

In 2016, we introduced our Structo Dentaform, our second dentistry-specific 3-D printer, tailored for orthodontic applications. A few weeks ago, we introduced the Structo Orthoform, the company’s first dentistry-specific 3-D printer, presented at this year’s International Dental Show in Cologne in Germany.

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Dentsply Sirona opens CEREC system

By DTI

COLOGNE, Germany: More than 155,000 people from 157 countries visited the International Dental Show (IDS) this year, according to the latest figures released by organiser Koelnmesse. This is an increase of 12 per cent compared with IDS 2013. Furthermore, the number of international attendees rose by almost 20 per cent to around 60 per cent.

This year’s edition focused on digital production and diagnostics, intelligent networking solutions for practices and laboratories, smart services for dentists and dental technicians, as well as the further improvement of patient care and thus oral health worldwide.

Read about this year’s show on the following IDS review pages.

IDS 2017 SETS NEW RECORD

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W&H previews new image campaign

By DTI

In addition to introducing the company’s latest advancements in Cologne, W&H Managing Director Peter Malata previewed a new image campaign and shared his vision for the family-run company in light of the dental industry’s recent trend towards mergers.

A new product highlighted by Malata and Roland Gruber, Head of Marketing and Sales for W&H Austria and W&H Germany, was the Primes Advanced Air System, the world’s first air-operated high-speed dental drive solution that combines the advantages of a turbine with the key strengths of an electric motor. "W&H has tamed the air," said Malata in introducing the product.

Clark further announced that the company would continue to grow and sharpen its profile in the field of endodontics with the acquisition of RTD (Recherches Techniques Dentaires). The French owner-managed company is a leading supplier of composite pens and will complement Dentsply Sirona’s endodontic and restorative portfolio.

"RTD’s innovative offering completes our new R2C—"The Root to Crown Solution," said Jeffrey T. Slovin, CEO of Dentsply Sirona. "Thanks to R2C and RTD, we will be able to offer dentists an even more comprehensive end to end solution for better, safer and faster root canal treatments and dental restorations."

Another important announcement was the opening of the CEREC system. Practitioners will now be able to export data from the digital impression in STL format for use with other applications in the dental laboratory or clinical planning software. This will make the world’s most used CAD/CAM system more flexible and therefore even more user-friendly for dentists.

According to the company, the STL format ensures compatibility with all common design programs used in laboratories. The corresponding software licence will be available with the new CEREC SW 4.5.

For Ivoclar Digital, new products have been added to the company’s range of aesthetic, state-of-the-art CAD/CAM materials for fixed, removable and implant-supported prosthetic restorations, including versatile ZInCAD blocks and a range of discs for the IPS e.max system. Dentists and laboratories will be able to digitally produce dental restorations quickly and easily with four new PrograMill digital milling units that are suited for laboratories of all sizes. The range of high-end scanners from 3Shape has also been extended to include the new 3Shape E series, which, together with the Dental Designer software and exclusively developed Ivoclar Digital software add-ons, is aimed at increasing the reliability and efficiency of fully digitised processing procedures.

To this end, the company’s long-standing managing director also made a statement on W&H’s position regarding the international merger trend. Although merging could be considered both a threat and an opportunity, W&H sees the company’s strengths in maintaining a philosophy that is based on tradition and a close-knit community of partners and employees, he said. “There are different mindsets out there regarding consolidation versus family business and the benefits of both. However, in my opinion, in the future, it will be important to allow individual companies to pursue their own innovations while networking more closely with others.”
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DTI Publishers’ Meeting

By Julia Maciejek, DTI

COLOGNE, Germany: Ahead of the 37th International Dental Show, Dental Tribune International (DTI) held its 15th Annual Publishers’ Meeting. This year, the meeting, which was attended by more than 75 licence partners from all over the world, including India, Iran, Israel, Italy and the Netherlands, discussed a number of new projects for the upcoming year and strategic approaches for future development.

At the meeting, DTI CEO Torsten Oemus addressed new trends in the global dental industry, as well as the relevance of online education, e-commerce for dentistry and event marketing. In response to these needs, DTI is continuously updating and expanding its portfolio, gradually developing into a digital dental service platform, he said.

New prevention magazine

DTI is continuing to expand its print portfolio and introduced its latest addition during the meeting: prevention. The new international magazine will feature topics concerning oral health and be released during the Annual World Dental Congress of the FDI World Dental Federation in Madrid in Spain this year.

New website

In response to the growing need for digital dentistry technologies and the increasing importance of digital media, DTI is relaunching its website this year as part of its continuing portfolio expansion. For improved usability, the navigation and menus of the local websites will be in local languages. The fresh look will include a modernised, interactive layout, with a focus on company profiles. Furthermore, the website will use several new advertising and content formats. A revised calendar with upcoming webinars and global events, as well as a map, will aid readers. In addition, an updated version of e-papers will be available for iPads.

IDS.WORLD

As a next step to further integrating e-commerce into its portfolio, DTI has continued to develop IDS.WORLD, a new digital marketplace. “A business is valued by the interaction with its clients and we need to continuously find new ways to engage with them. We need to adapt our business to the changing context,” explained Oemus. IDS.WORLD is available at www.ids.world, is a full-service digital marketplace for products, news, e-learning and practice management. It is targeted at all participants in the dental industry. It offers product listing and an associated search facility, a practice management software program, direct customer communication tools and much more. The comprehensive website has the potential to be a gamer-changer in the provision of digital dental services to the industry. “The digital world is becoming increasingly important in this context,” emphasised Oemus.

ROOTS SUMMIT

As part of its expansion, DTI is moving towards the events business and already organises the ROOTS SUMMIT, the discussion forum for endodontics. Following on the success of last year’s event in Dubai in the UAE, with over 900 attendees, the next edition will take place in Berlin in Germany from 28 June to 1 July 2018. The ROOTS SUMMIT began as a dedicated Facebook group, growing from a membership of 1,000 in 2013 to more than 22,000 currently, including dental professionals from well over 100 countries.

The next Publishers’ Meeting will take place at the Black Sea in 2018 and will be hosted by Dental Tribune Bulgaria.

“The opportunity to stay innovative”

By DTI

After only two years of development, Japanese company NSK presented the world’s first lightweight mobile dental treatment unit, among other new products, at IDS. At the show, President and Chief Operating Officer Eiichi Nakashii spoke with Dental Tribune about the device and how his company has stayed ahead in developing innovative solutions for dentistry.

Dental Tribune: Mr Nakashii, at IDS 2015, we spoke about sterilisers and premium handpieces. What is the focus of this year’s presentation by NSK?

Eiichi Nakashii: We are focusing on two specific categories of products, in the fields of hygiene and prophylaxis, including the Varios Combi Pro. The device combines a prophylaxis scaler with powder treatment and will allow clinicians to effectively treat peri-implantitis, which has become a major issue around the globe.

We are also very proud of the new VIVA ace, our portable treatment unit, which is very lightweight and can perform all treatments in Japan and in many other countries, including China. The popularity is increasing among many elderly people who are not able to visit a dentist. Our device is aimed at addressing this issue by allowing people to be treated in their homes, for example. It is the first device of its kind in the world.

That is quite impressive. What has been the feedback on the device been in your home country and here at IDS?

Nakashii: We only introduced the device in Japan last year, but it has already proved to be a great success. Within only a few months, we sold over 1,000 units. The response here in Cologne has also been extremely positive, and we are in talks with German dealers regarding the distribution of the device.

NSK has a unique position in the market, as it is still family-owned, in comparison with many other companies in the market that have grown through acquisitions or mergers in recent years. Where do you see the benefits in this?

It is true, many companies, like Dentatus Sirona, are becoming constantly larger and they can virtually offer everything. This is, of course, something we may need to compete with in the future. However, we still see many benefits in having a more focused portfolio. It gives us the opportunity to stay innovative and develop unique products like the VIVA ace.

3Shape: TRIOS 3 Wireless

By DTI

Gathering an impressive crowd at 3Shape’s booth, Tais Clausen and Rune Fisker, 3Shape co-founder and Chief Technology Officer and Vice President for Product Strategy, respectively, at 3Shape, presented the company’s brand-new digital solutions at IDS. In addition to the Danish manufacturer’s new affordable E scanners and its Xi scanner, which delivers CBCT, panoramic, cephalometric and facial scanning in one system, the new TRIOS 3 Wireless especially was enthusiastically received by the audience.

The wireless version of 3Shape’s award-winning TRIOS intra-oral scanner connects via Wi-Fi to a laptop and the TRIOS cart and eliminates the need for a connecting cable between the intra-oral scanner and computer. “This takes conveniences to a new level,” commented Clausen enthusiastically about the new product. In demonstrating the benefits of the wireless device, Clausen walked through the audience while scanning his own teeth and using the wand to navigate between scan pages on the monitor from a distance—attracting excited applause from the audience.

www.dds.world, is a full-service digital marketplace for products, news, e-learning and practice management. It is targeted at all participants in the dental industry. It offers product listing and an associated search facility, a practice management software program, direct customer communication tools and much more. The comprehensive website has the potential to be a gamer-changer in the provision of digital dental services to the industry. “The digital world is becoming increasingly important in this context,” emphasised Oemus.
The silent assistant for efficient relative isolation for nearly all indications

Using the OptraGate lip and cheek retractor in daily dental practice

An interview with Dr Patrick Dipsche, Germany

When it comes to successful dental treatment, it is not only important to use solutions that facilitate the dentist’s work; physical comfort of the patient is equally important. With OptraGate, dental manufacturer Vivera Vivadent has introduced a lip and cheek retractor that considerably facilitates isolation of the treatment area in a multitude of dental procedures while being gentle and comfortable to wear for the patient. In the following interview, Dr Patrick Dipsche, an orthodontist, speaks about the benefits of the product for both patients and practitioners.

In which treatment situations do you especially like using OptraGate?

Dr Patrick Dipsche: As an orthodontist, I particularly like using OptraGate for intra-oral scanning and indirect bonding of lingual brackets. My assistants like to use it in the provision of prophylactic care, as they often perform these tasks alone and appreciate the effective retraction of the lips and cheeks that this device offers.

In your opinion, what are the key advantages of the product?

Although it may not seem so at first, OptraGate can actually be positioned easily and quickly in the patient’s mouth. This is something I greatly value. An auxiliary such as a lip and cheek retractor must be easy and quick to use in order to be integrated into regular treatment procedures.

How does OptraGate help you in your workflow?

I would say that the gentle and effective retraction of the lips and cheeks is the most helpful feature and this feature also makes it considerably easier to achieve relative isolation. I do not have to move the tissues out of the way with the mirror all the time and I can concentrate more intensely on the actual treatment.

Would you say that OptraGate allows you to work more efficiently?

Yes. As I can concentrate more intensely on the actual treatment procedure, I automatically work faster. This generally has a favourable effect on my treatment results. Is this not the definition of efficiency? The output is the same, at least, if not better, while the use of resources is optimised. In this context, my resource is time and my output is the treatment result. I would say that I save about 5 minutes per patient on average.

What do your patients tell you after they have been treated with it?

Well, no patient ever likes wearing a retractor. However, I definitely feel that they tolerate OptraGate better than rigid retractors. This is, of course, fantastic for us.

Do you feel that your patients find it comfortable to wear OptraGate?

I definitely feel that they tolerate OptraGate better than rigid retractors, because it is made of soft material and flexibly adapts to movements. However, subjective perceptions of comfort have to be taken with a grain of salt. All patients prefer not to be restricted in their movements. Compared with the existing alternatives, however, OptraGate always elicits a positive reaction from my patients.

Do you feel that your patients find it comfortable to wear OptraGate?

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Are there fewer interfering movements of the lips and jaws when the OptraGate retractor is worn?

Yes, I feel that, on the whole, the treatment goes more smoothly. Usually, one has to constantly remind patients to keep their mouths open during treatment, as they tend to reduce their mouth opening after a while to relax their muscles. Additionally, sometimes a protective reaction is inadvertently elicited from the patient when the tissue is moved away somewhat abruptly with a mirror. Such occurrences are clearly reduced with OptraGate because the mouth stays wide open without active involvement of the muscles, allowing the patient to rest against OptraGate. As the tissue is retracted evenly throughout the treatment, spontaneous protective movements of the patient can be avoided.

Is it easy to place in the patient’s mouth?

Yes, in most cases. At first, it takes a bit of time to get used to it, but once one has got the hang of it, one would not want to do without it.

I definitely feel that they [patients] tolerate OptraGate better than rigid retractors.

How would you describe OptraGate in one sentence?

Hmm… the silent assistant for efficient relative isolation for nearly all indications. I really like the product. Particularly when I have no assistant on hand to help out, it is an exceptionally useful auxiliary for which there is no real alternative. Once one has got the hang of it, one would not want to do without it.

Thank you very much for the interview.
Acupuncture: Probing its way into dentistry—Part I

An introduction to acupuncture and its practical applications in contemporary dental practice

By Dr Wong Li Beng, Singapore

The history of traditional Chinese medicine (TCM) can be traced back to the Warring States and the Qin and Han dynasties more than 2,000 years ago. The Huangdi’s Inner Classic of Medicine, of comparable importance to the Hippocratic corpus in Greek medicine, is a scholastic collection of medicinal doctrines and philosophies accumulated over the years. To date, it still provides a theoretical guide and basis for the development of contemporary TCM. It consists of two parts, Suwen (plain questions), which mainly addresses the theoretical aspects and diagnostic methods, and Lingshu (spiritual pivot), which covers the practice of acupuncture.

Acupuncture, according to the definition of the TCM Practitioners Act in Singapore, means 'the stimulation of a certain point or points on or near the surface of the human body through any technique of point stimulation (with or without the insertion of needles), including through the use of electrical, magnetic, light and sound energy, cupping and moxibustion, to normalise physiological functions or to treat ailments or conditions of the human body'. In order to understand the role of acupuncture therapy in TCM, we must first appreciate the fundamental treatment philosophies in TCM. TCM is premised on the concept of holism, according to which the human body is seen as an organic whole; all the constituent parts are interconnected and they coordinate and interact with one another functionally. There is also recognition of humans’ interaction with the external environment and its effect on the human body. The state of the constitution of the human body at the point of challenge by pathogenic factors (both internal and external), will determine the occurrence and progression of disease. The constitution of the body can be regulated by maintaining the yin–yang and qi–blood balance. The vital qi, or life force, is viewed as keeping the entire body system going. It circulates all over the body along designated pathways called “meridians”. To put it simply, acupuncture therapy involves the stimulation of certain points along the meridians to allow the free flow of qi to maintain yin–yang and qi–blood balance. The pathogenesis of disease based on TCM philosophy is summarised in Figure 1.

This concept of host–pathogen interaction, according to which the manifestation of disease presentation depends on both the virulence of the invading pathogens and the host response, has parallels with some of the modern concepts of disease progression in Western medicine, for example the pathogenesis of periodontitis (Fig. 2)—an inflammatory disease initiated by oral micro-organisms, resulting in the loss of supporting structures around the dentition.

The story of New York Times editor James Reston, whose post-appendectomy pain was relieved by acupuncture, and the visit of US President Richard Nixon to China in 1971 brought acupuncture into the limelight and created much interest in the Western medical field. In 1979, the World Health Organization (WHO) endorsed the use of acupuncture for treatment of 43 symptoms. In 1996, WHO’s endorsement of acupuncture was extended to 64 indications. In the Geneva 2003 WHO report, pain in dentistry (including dental pain and temporomandibular joint dysfunction syndromes), facial pain and postoperative pain were listed among the conditions for which acupuncture had been proven, through controlled trials, to be an effective treatment.

Scientific basis of acupuncture

Acupuncture treatment involves the excitation of qi or “de qi”, which is the transmission of needling sensation along the meridians, often described by patients as soreness, numbness, ache, fullness or a warm sensation as a result of needle manipulation. This is also perceived by the acupuncturist as a needle grasp sensation, which is key in achieving...
therapeutic efficacy. Recent histological evidence using rat models suggests that this needle grasp sensation is the result of collagen and elastic fibres tightening around the needle during needle manipulation. The authors went further to postulate that this mechanical coupling between the needle and soft tissue is responsible for transducing mechanical signals to fibroblasts and other cells, with resultant therapeutic downstream effects.

How acupuncture can relieve pain can be explained by the gate control theory of pain. It proposes that the activation of alpha delta and C afferent nerve fibres through acupuncture point stimulation sends signals to the spinal cord, with local release of dynorphins and enkephalins. Upon reaching the midbrain, both excitatory and inhibitory mediators are activated in the spinal cord. Neurotransmitters, like serotonin, dopamine and norepinephrine, are produced, causing pre- and postsynaptic inhibition of pain transmission. When the signals reach the hypothalamus and pituitary gland, adrenocorticotropic hormones and endorphins may be produced. This forms the basis of our current understanding of the analgesic effect of acupuncture in Western medicine, although other therapeutic effects of acupuncture, such as in the treatment of nausea, gastritis, asthma and dysmenorrhoea, are yet to be fully explained. In the case of asthma, one of the therapeutic acupuncture points, BL13 (feishu), lies approximately 1.5 cm (38.1 mm) lateral to the level of the spinous process of vertebra T3. It has been hypothesised that the location of BL13 (Feishu) corresponds roughly to the sympathetic ganglion at the level of T3, which sends postganglionic fibres to the pulmonary plexus and cardiac plexus.

Dental application of acupuncture

Managing dental pain, analgesic effect and postoperative pain relief

According to TCM theory, local acupuncture points on the facial regions, like ST6 (jiache) and ST7 (xiaguan), and distant points, like LI4 (hegu), can be used to treat dental pain. They are part of the stomach and large intestine meridians, which converge at the facial region and link up with the maxillary and mandibular teeth, respectively. Western medical literature has proposed that acupuncture can produce an analgesic effect at a distant site by diffuse noxious inhibitory control. This provides a possible explanation as to how the acupuncture point LI4 (hegu), which is located on the radial side of the second metacarpal bone on the dorsum of the hand, can elicit an analgesic effect in the orofacial region.

The role of acupuncture in contemporary dentistry may not be so much the removal of the aetiology of dental pain, but rather as an adjunct in achieving anaesthesia during dental procedures and providing postoperative pain relief. A pilot study was conducted to investigate whether the induction time of local anaesthesia can be shortened.

“...studies have shown that acupuncture can reduce postoperative pain.”

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A patient receiving acupuncture treatment (left).—Modern prepacked, sterilised acupuncture needles used for treatment (right).

of the mandibular branch of the trigeminal nerve were stimulated before an inferior alveolar nerve block was given using prilocaine hydrochloride, the induction time was 62 seconds, versus 119 seconds in the control group, in which only the nerve block was given. Findings from this study suggest that regional acupuncture can accelerate the induction time after an inferior alveolar nerve block. The results of another study indicate that acupuncture before inferior alveolar nerve block may increase its effectiveness in endodontic treatment of mandibular molars with symptomatic irreversible pulpitis. Several studies have shown that acupuncture can reduce post-operative pain. A systematic review of 16 studies found that acupuncture therapy can help to alleviate postoperative pain, although heterogeneity in terms of methodological details among the studies reviewed may limit the conclusions that can be drawn. The practical implication of acupuncture therapy in alleviating postoperative pain may be helping to reduce the patients’ dependence on systemic analgesic medications. It is well documented that the use of non-steroidal anti-inflammatory drugs for pain control is associated with increased risk of gastrointestinal complications, like ulceration and bleeding. A randomised placebo-controlled trial was conducted to evaluate the efficacy of acupuncture in treating postoperative oral surgery pain. The treatment group that received real acupuncture treatment immediately after the surgical removal of impacted lower third molars had a significantly longer pain-free postoperative period (52.9 minutes) compared with the placebo group (99.8 minutes). More importantly, the treatment group took a significantly longer time to request analgesics than the placebo group (466.2 minutes). They also took significantly less medication (1.1 tablets of 600 mg acetaminophen with 60 mg codeine) compared with the placebo group (1.85 tablets); this difference was still evident at the seven-day follow-up (1.77 tablets versus 1.13 tablets). More randomised controlled clinical trials to verify the role of acupuncture therapy in dental pain management, particularly in postoperative pain, may be warranted.

Management of temporomandibular joint dysfunction syndrome and orofacial pain

Temporomandibular joint dysfunction syndrome (TMD) is a term that includes a group of conditions that affect the temporomandibular joint (TMJ), the muscles of mastication, and the associated head and neck musculoskeletal structures. The clinical diagnostic criteria for TMD classify the most common forms of TMD into the main subgroups of masticatory muscle disorder, TMJ internal derangement and TMJ degenerative joint disease.

The treatment of TMD depends on the aetiologies of the conditions. While acupuncture therapy may not be useful in eliminating the cause if it is due to structural anomalies, like capsulitis and degenerative changes, it may help to relieve the pain and discomfort associated with the conditions, especially if it is muscular in nature. It has been documented that acupuncture can help in muscle relaxation and reduce muscle spasm. Relaxing the lateral pterygoid muscles can reduce the anterior displacing force on the meniscus of the TMJ and help to minimise TMJ clicking.

A systematic review of 19 randomised controlled trials was conducted to assess the effectiveness of acupuncture for symptomatic treatment of TMD. The findings suggest moderate evidence for acupuncture as an effective intervention for the reduction of TMD symptoms, although more studies of larger sample sizes are needed to investigate the long-term effectiveness of acupuncture.
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Management of a non-vital central incisor with an open apex
Using a novel MTA-based repair material in a young patient

By Drs Mario Luis Zuolo & Arthur de Siqueira Zuolo, Brazil

The treatment of immature non-vital teeth with non-vital pulps and open apices often presents a challenge to the clinician. Cleaning and shaping the thin canal walls, controlling the infection, and performing satisfactory sealing of the apex are sometimes not possible.1 In most cases, the treatment involves the induction of apical closure by apexification procedures to allow more favourable conditions for the conventional treatment.2

Traditionally, calcium hydroxide has been the material of choice used to induce the formation of an apical hard tissue barrier before placing the permanent filling3. Although many studies have reported favourable outcomes when this treatment is used,1 disadvantages have also been reported. The use of calcium hydroxide apical barriers has been associated with some problems, such as unpredictability of apical closure,3 risk of re-infection due to leakage of the provisional filling3 and risk of root fracture as a result of the long-term application of calcium hydroxide.4 Furthermore, poor patient compliance has a negative influence on the prognosis of conventional apexification procedures.5

With the advent of the mineral trioxide aggregate (MTA), a calcium silicate-based, biocompatible, non-absorbable material, another treatment option was proposed.4 This material has the ability to set in a short period and in the presence of moisture,6 hardening and insertion. Additionally, its use can cause discoloration of the tooth, and it should be used with caution in aesthetic zones.7 A novel material, MTA REPAIR HP (high plasticity; Angelus), was recently introduced with the intention of improving some of those characteristics.8 This new formula retains all the chemical and biological properties of the original MTA, however, it changes its physical properties of manipulation, resulting in greater plasticity, thereby facilitating handling and insertion. Additionally, its formula uses a different radiopaque (calcium tungstate), which does not cause staining of the root or dental crown, according to the manufacturer.9

Several studies show that apexification with MTA has a high success rate with fewer visits and less time to completion.10 However, in a study that compared clinical and radiographic results of apexification with MTA or calcium hydroxide, all of the cases sealed with MTA healed, whereas in the calcium hydroxide cases, two out of 15 did not heal.2 However, MTA has some disadvantages too. Because of its consistency, its manipulation and placement in the site of repair can be challenging.2 Additionally, its use can cause discoloration of the tooth, and it should be used with caution in aesthetic zones.7 A novel material, MTA REPAIR HP (high plasticity; Angelus), was recently introduced with the intention of improving some of those characteristics.8 This new formula retains all the chemical and biological properties of the original MTA, however, it changes its physical properties of manipulation, resulting in greater plasticity, thereby facilitating handling and insertion. Additionally, its formula uses a different radiopaque (calcium tungstate), which does not cause staining of the root or dental crown, according to the manufacturer.9

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The treatment plan was to first perform the cleaning and shaping of the canal and to place a calcium hydroxide dressing. Then, after one to two weeks, with the regression of the symptoms, we would recreate an apical barrier with a new MTA-based material, obturate the tooth and restore it. The treatment plan was presented to the patient’s parents, who agreed to it.

After the consent form had been signed, 1.8 ml of local anaesthetic (2 % lidocaine with adrena-
line 1:000,000 was administered, the restorative material was removed, and endodontic access corrected. After rubber dam isola-
tion, the material inside the canal was removed under thorough irri-
gation using a 2.5 % sodium hy-
POCHLORITE solution (FORMULA & ACÃO) and a CPR-7 ultrasonic tip
(Obtura Spartan Endodontics). After the removal of the material
from the canal, F2 and F3 Largo
burs were used to prepare the first
two-thirds of the canal. Then, the
apical foramens were located with
the aid of an apex locator (RAYPEX,
VIDW), and the working length was
established at 0.0 and con-
ﬁrmed with a radiograph. Instru-
m entation proceeded using stain-
less-steel #K type hand ﬁles in a
crown-down technique until a
#80 hand ﬁ le achieved the work-
ing length. Between each ﬁ le
change, copious irrigation with
2.5 % sodium hypochlorite solu-
tion was performed (approxi-
mately 100 ml throughout the
entire treatment).

During the procedure, passive
ultrasonic irrigation was per-
formed for 1 minute several times
to ensure complete removal of the
old material and to maximise the
irrigation technique. After the
completion of instrumentation,
the canal was irrigated with 5 ml
of 17% EDTA (FORMULA & ACÃO) for
3 minutes and a ﬁ nal rinse with
5 ml of saline solution. A calcium
hydroxide-based paste was placed
in the canal as an inter-apoint-
ding agent. After 10 minutes, the mate-
rial inside the canal was re-
moved, and endodontic access
was restored (Fig 2). After
ten days, the patient came to the
clinic for conclusion of treatment.
The tooth was asymptomatic, and
the area was no longer swollen.
The temporary ﬁ lling was re-
moved, and the calcium hydrox-
ide paste was removed from the
canal using a 2.5 % sodium hy-
POCHLORITE solution and passive
ultrasonic irrigation as previously
described. The #80 hand ﬁ le was
used again to working length. The
channel was then irrigated with 5 ml
of 17% EDTA for 3 minutes to re-
move the smear layer, and 5 ml of
saline solution was used for the
ﬁ nal rinse. The canal was dried with
paper points, and MTA REPAIR HP
was manipulated according to the
manufacturer’s instructions and
placed with the aid of plugs (
BRASER Biotech) in the last 3 mm
of the root canal, forming an apical
plug. After 10 minutes, the mate-
rial had set, and the tooth was ob-
turated using BC Sealer (BRASER
Biotech). The working length was
established at 0.0 and con-
ﬁrmed with an apex locator (RAYPEX,
VIDW) and the working length was
established at 0.0 and con-
ﬁrmed with a radiograph.

The pulp chamber was cleaned
with a sponge soaked in 70% alco-
hol, and the access cavity was re-
stored using composite (Figs. 4a & b).
A high-resolution CBCT scan of
the patient was requested imme-
diately after treatment so that it
could be used for comparison later
in the follow-up.

The patient presented for re-
call one month later without any
symptoms. Postoperative radi-
ographic and clinical evaluations
were performed at three, six and
nine months. The tooth was
asymptomatic, and the area did
not have any signs of inﬂ amma-
tion. After nine months, another
CBCT examination was con-
ducted. Comparison of the CBCT
images was performed, and bone
healing and apical closure of the
open apex could be observed (Figs. 4a & 4b, 5a & 5b).

Figs. 5a & b: CBCT images. (a) Sagittal view just after MTA REPAIR HP placement. (b) Sagittal view at the nine-month follow-up. Reformulation of the cortical plate is visible, as well as partial apical closure.
Discussion

Previous clinical studies in humans have demonstrated that an apical barrier of MTA can be used with success in the technique of apexification of teeth with open apices. El-Meligy and Avery ran a clinical trial comparing the use of calcium hydroxide and MTA in 30 teeth of 15 patients who had lost pulp vitality through caries or trauma. The conventional technique of apexification with calcium hydroxide was performed in one tooth, whereas the barrier technique with MTA was applied to the other tooth in the same patient. The teeth were then followed up for three, six and 12 months. Two of the teeth filled using calcium hydroxide failed, while none of the teeth filled with MTA showed clinical or radiographic signs of pathology. Simon et al. carried out a prospective clinical trial in 57 teeth of 50 patients with open apices treated with MTA plugs and definitive filling of the canal and observed success in 81% of the cases. In this case report, the use of a modified MTA (MTA–bioceramic-based high-plasticity reparative cement) achieved a good clinical result over the short follow-up period. Comparison of CBCT images just after placement of the MTA barrier and after a nine-month period demonstrated bone formation and apical closure by hard tissue. It should be noted that a radiolucent area could be seen at this time. Such a healing pattern could be classified as incomplete healing, according to Molven et al.

From a clinical perspective, the handling and placement of the MTA REPAIR HP was easier than with the conventional MTA. According to the manufacturer, the difference between MTA REPAIR HP and the original Angelus MTA is the replacement of distilled water with a liquid that contains water and another organic plasticiser that gives the new product high plasticity (Fig. 6). The manufacturer claim that the new MTA does not promote dental discoloration could not be studied in this case, since the material was placed in the apical portion of the canal.

The importance of case reports is the demonstration of what is possible in our patients using scientific clinical treatment protocols. Reports from clinical practitioners have played important roles in the field of dentistry, but should be validated through proper laboratory and clinical research studies. In conclusion, the clinical protocol using the new MTA REPAIR HP, as described in this case report, enabled the successful apexification of a central incisor in a young patient.

Editorial note: This article first appeared in the Endodontic Practice US magazine (Vol. 9, No. 2). Reprinted with permission. A list of references is available from the publisher.

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“Our approach to business remains uniquely different in the implant segment”

An interview with MegaGen CEO Dr Kwang-bum Park

By Claudia Duschek, DTI

MegaGen is one of the fastest-growing dental implant companies in the world market. After the South Korean company only recently announced that it was discontinuing its business relationship with a global implant manufacturer, Dental Tribune had the opportunity to speak with Dr Kwang-bum Park, CEO of MegaGen, at the International Dental Show (IDS) about the company’s participation at the trade fair and its future global market strategies.

Dental Tribune: IDS is a unique opportunity for dentists to experience implant products live and gain an overview of the latest developments in the field. What are your expectations for IDS?

Dr Kwang-bum Park: We have always viewed IDS as the key location to meet international partners and to present our new products to the market. This year, we look forward to getting to know more dentists and involving them in our MegaGen family. In 2017, we continue to highlight our AnyRidge implant system, which has seen increasing demand from patients for instant smiles. In addition, we are promoting ExCATE, a digital solution for dentists, bringing a streamlined digital approach to implant treatment ever closer.

Dental implants were first introduced in South Korea about 20 years ago. How has implantology evolved in the country since then?

The growth of implant dentistry in South Korea has been a phenomenon that can be equalled only in a few other countries, such as in Italy and Israel. High-level implant surgery is the standard in South Korea, and unless strong contra-indications are present, implants are the absolute standard for replacing missing teeth. Dental care in general is a high-priority health care consideration in all South Korean families. It is widely available and the average overall dental health of the population is good.

Today, MegaGen exports its products to 90 countries worldwide, including many European countries. How important is this market for you, and how do your products perform in this market?

As it is one of the world’s largest implant markets, the European market remains our greatest export market. We have been active in Europe for ten years now and are still experiencing a growth of over 20 per cent on average in this market, which we expect to continue over the coming year. Our largest expected growth, however, is in the newer markets, with key product launches in India and Japan, Russia and other countries of the Commonwealth of Independent States last year. We expect to rival our European market share across the Asian, Middle Eastern and African markets. We also expect to achieve double-digit growth in the US in 2017.

With a number of major company mergers and increasing competition worldwide, the international implant market is expected to change and grow over the next few years. How do you evaluate this development, and how does MegaGen intend to compete in the future?

MegaGen is growing strongly as an independent company. We remain focused on customer satisfaction, product development and better patient outcomes. We have clinicians at the top of our company who are still practising implant dentistry, which gives us a unique insight into what dentists need to improve their and their patients’ lives. We believe that the implant business is going to continue to grow as implants become the standard of care for tooth replacement worldwide. We have found that our approach to business remains uniquely different in the implant segment. We remain open, of course, to discussing possible future partnerships if we find compatible partners with whom we can establish a clear and good understanding. Meanwhile, we will continue to develop our implant product line and the digital approach, which we believe is the future for reliable patient outcomes. Our strong partners worldwide stand with us and we foresee continued excellent growth for our company.

PROSEC: New quality initiative for metal-free implantology

By DTI

COLOGNE, Germany: At the International Dental Show (IDS) in Cologne, VITA Zahnfabrik has introduced a new specialist network for metal-free implantology PROSEC (Progress in Science and Education with Ceramics), which was established with the aid of the vitaclinical division a year ago. At the event, founding members and experts of the quality initiative gave insights into current research in implant stability, osseointegration and the biocompatibility of metal implants versus ceramic implants, among others.

Representing the initiative, PROSEC President Dr Jörg Strub said that PROSEC aims to act as a bridge between science and practice. Its goals are to foster close collaboration between specialist organisations, practitioners and science in order to establish high-quality standards in metal-free implantology and thereby improve the well-being of patients.

On its website, www.prosec-network.com, the organisation will present the latest findings, promote joint clinical studies and provide a platform for expert discussion, he said. In addition, an annual conference will serve to document the progress in the field and share knowledge on a global scale.

“It is great fun for me to accompany the ‘ceramics project’ scientifically,” panel speaker and founding member Prof. Wilfried Wagner, Director of the Department of Oral, Maxillofacial and Plastic Surgery at the Mainz University Medical Center in Germany, said.

Concerning the organisation’s scientific approach, he said that, ideally, knowledge will be gathered in a three-stage process. First, all data in the field will need to be collected and edited, before new data can be systematically be accumulated in field research and randomised studies, which will form the second and third stages of the process.

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Nano-coating effective in reducing peri-implantitis risk

By DTI

PLYMOUTH, UK: Investigating the effect of a new approach using a combination of silver, titanium dioxide and hydroxyapatite (HA) nano-coatings on the surface of titanium alloy implants, researchers from Plymouth have found that the method was successful in inhibiting bacterial growth and reducing the formation of bacterial biofilm. In addition, the coating created a surface with anti-biofilm properties, thus supporting successful integration of the implants into surrounding bone and accelerating bone healing.

One of the main reasons for dental implant failure is peri-implantitis, an inflammatory process affecting the soft- and hard-tissue surrounding dental implants caused by pathogenic microbes that develop into biofilms. Current approaches to managing the development of biofilms include application of antimicrobial coatings loaded with antibiotics or chlorhexidine. However, these are usually only short-term measures. In addition, chlorhexidine has been reported to be potentially toxic to human cells.

Investigating a new approach, researchers from the University of Plymouth tested the effectiveness of a dual-layered silver–HA nano-coating on titanium alloy medical implants. The antibacterial performance of the coating was quantitatively assessed by measuring the growth of Streptococcus sanguinis, the proportion of live and dead cells, and lactate production by the microbes over 24 hours.

The results showed that the combination successfully inhibited bacterial growth and reduced the formation of bacterial biofilm on the surface of the implants by 97.5 per cent. Uncoated controls and titanium dioxide nano-coatings showed no antibacterial effect.

According to the researchers, no dissolution was detected for the HA nano-coatings. Thus, application of a dual-layered silver–HA nano-coating on titanium alloy implants further created a surface with anti-biofilm properties without compromising the HA biocompatibility required for successful osseointegration and accelerated bone healing.

“In this cross-faculty study we have identified the means to protect dental implants against the most common cause of their failure. The potential of our work for increased patient comfort and satisfaction, and reduced costs, is great and we look forward to translating our findings into clinical practice,” commented Prof. Christopher Tredwin, Head of the Peninsula School of Dentistry.

In the next step, the effectiveness of the approach needs to be tested in vivo, according to the researchers.

The study, titled “Antibacterial activity and biofilm inhibition by surface modified titanium alloy medical implants following application of silver, titanium dioxide and hydroxyapatite nano-coatings”, was published online on 17 March in the Nanotoxicology Journal.
“Implant failure is a failure for both the dentist and the patient”

By Marc Chalupsky, DTI

Originally from Syria, Dr Iyad Estoiny obtained his master’s degree in fixed and removable prosthodontics in France before moving to Dubai in 1997. An implantologist and oral dentist at GC Clinics in the heart of Dubai, Estoiny also focuses on prosthodontics and aesthetics. In an interview with Dental Tribune, the implant specialist spoke in favour of proper oral hygiene and individual prophylaxis training, two areas of dental care that are essential for long-term implant success.

Dental Tribune: You are originally from Syria. How was the dental training at your school?

Dr Iyad Estoiny: I received my DDS in 1991 from Taibeh University in Syria. There are four dental schools in Syria, along with many practitioners. A number of Syrian dentists have moved to the UAE because of their good dental knowledge. The dental education is still excellent in Syria.

Can you summarise the state of oral health in Dubai?

As Dubai is a multicultural city, one sees problems from all over the world. Some patients are highly motivated in terms of their oral hygiene, while one has to put in a great deal of effort with some others. In terms of oral hygiene, I have seen that people have started to become aware of dental problems and products. In the last five years, people have become more focused on beauty and aesthetics, which in turn has led to a higher interest in healthy teeth.

We also have an overwhelmingly young population in this country, consequently, there are only a few older dentists here. Eighty per cent of expats are young. This means that one does not see any advanced periodontal problems, but one does increasingly see stress-related bruxism, which in turn leads to periodontal problems.

How would you evaluate the market for oral hygiene in this region?

The market here is competitive and small. We do not sell the products, but give it to the patients. If they like it, they can buy it at the pharmacy. This has worked well.

For us, it is important to ensure that patients have the correct interdental brush size. This means that we tell them what size they need. A dental hygienist or periodontist usually gives instructions and explains everything. One always needs to determine the correct sizes and give proper instructions.

As an implant specialist, what do you think about prevention?

There does not seem to be a strong connection between implantology and prevention at first, but just look at the problem of peri-implantitis. One needs to treat peri-implantitis as a bacterial problem and thus one must give clear instructions for cleaning, which involves interdental brushes and mouthwashes. Prevention is always the golden rule for any implant. If I do not see good oral hygiene in my patient’s mouth, I do not place the implant. I wait for a couple of months for the oral hygiene to improve. If I consider it acceptable, then I place the implant.

How do you deal with implant failure?

Implant failure is a failure for both the dentist and the patient. It is a headache for dentists, and in the worst case, patients will not be able to enjoy a beautiful smile. Periodontal treatment and good oral hygiene are important before and after every implant placement. Before and after surgery, I usually explain oral hygiene and motivate my patients just recently. I placed an implant in an 84 year-old patient. Six months after placement, I have seen improvement owing to interdental brushes.

Oral hygiene treatment is mostly taken care of by dental hygienists. Most larger clinics employ at least one dental hygienist and it seems that Dubai citizens make extensive use of them. There is a good partnership between hygienists and dentists.

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A holistic view on medical conditions that includes oral health has not been established in clinical medical practice.

You completed a programme on individually trained oral prophylaxis (ITOP). What was your impression?

I did the ITOP programme a year ago. Although I liked the programme a great deal, we have still seen that not all patients take the time and really apply what they have learnt. Some patients are really motivated and sit down with us to learn more about the system. The dentist and dental hygienist then work together. In today’s fast-paced world, we need to convince patients that they have to take care of individual prophylaxis. For dental hygienists and dental students, ITOP gives dental professionals a gradual awareness of how to provide oral hygiene for their patients. I think that ITOP for students will work well for future dentists.

Thank you very much for the interview.
Robotic guidance system could be game-changer for implant dentistry

By DTI

MIAMI, US: Implant dentistry is about to make a leap in development, at least if things go the way US company Neocis predicts. After introducing Yomi, the first robotic system developed for dental implant placement, and receiving Food and Drug Administration (FDA) 501(k) clearance to market its pioneering surgical assistance system, the company has now announced the completion of the first sale of its device.

The dental implant and prosthetic market is one of the fastest-growing markets in the US. Equally thriving is the surgical robotics market, which is estimated to reach $20 billion across several medical markets by 2021. Combining both medical fields is Yomi, which is intended to provide assistance in both the planning (preoperative) and the surgical (intraoperative) phases of dental implant surgery.

Commenting on receiving FDA clearance in March, Neocis CEO and co-founder Dr Alon Mozes said, “We are excited to achieve this important milestone for Yomi. We look forward to further demonstrating the benefits of Yomi to the surgeon’s practice and their patients and to bringing the system to select key opinion leaders in the United States.”

According to Neocis, Yomi is engineered to eliminate dentists’ dependence on plastic drill guides, which can impede the site of surgery and block proper irrigation and visibility. The computerised navigational system delivers physical guidance through the use of haptic robotic technology, which provides sensory feedback and constrains the drill in position, orientation and depth. Notwithstanding its digital guidance, the surgeon remains in control and can dynamically change the plan during the procedure, the company emphasised.

Neocis further noted that it is committed to ensuring that dentists who choose to use Yomi in their practice undergo sufficient training on the use of the software and the workflow of the system.

The first clinic to use Yomi in daily practice will be the South Florida Center for Periodontics and Implant Dentistry in Boca Raton, Florida. Neocis stated in a press release. The system has been installed, and Drs Jeffrey Ganeles, Frederic Norkin and Liliana Aranguren have completed training.

“Using Yomi, surgeons will be able to enhance the accuracy, reliability and flexibility of implant procedures, developer Neocis has claimed.

OSA and implant complications

By DTI

VITORIA, Spain: There has been increasing awareness of the reciprocal relationship between obstructive sleep apnoea (OSA) and dental problems, for example sleep bruxism and a higher clench index. However, few studies have investigated the role of OSA in the occurrence of technical failure in fixed prostheses, especially those that are implant borne. A Spanish study has found that over 80 per cent of the patients with OSA experienced implant problems — suggesting a potentially strong correlation between the sleep disorder and implant complications.

Aiming to analyse the frequency of prosthetic complications in implant-borne prostheses, a group of researchers from Vitoria investigated implant failure in 67 patients. They identified 30 complications affecting 22 prostheses among 16 patients. Of these, 13 also had OSA (81 per cent).

Complications included porcelain fracture (14 events), screw/implant fracture (eight events), screw loosening (three events) and de-cementation (five events). According to the researchers, most of the complications occurred in the posterior segments. Moreover, the highest apnoea–hypopnea index score, and thus the severity of OSA, was identified in patients with a fracture complication related to an implant, a screw or a porcelain crown, the study showed. The average time for problem occurrence was 73 months after insertion of the implant.

The study, titled “Frequency of prosthetic complications related to implant-borne prosthesis in a sleep disorder unit”, was published in the February issue of the Journal of Oral Implantology.
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The use of narrow implants

By Dr Huub van’t Veld, Netherlands

The development of very narrow implants can provide a solution for interdental spaces in the aesthetic zone that are smaller than 5–6 mm and in which implant placement is indicated to fill the diastema with an implant-supported crown. Increasingly, in the choice of implant, not only the quantity (Ø 1 mm) and quality of the surrounding bone are important, but the supporting function of the bone to obtain a good mucoal seal is too. The major implant brands have developed small-diameter implants for these narrow spaces. Nobel Biocare has the 3 mm NobelActive implant, concerning which many publications have already appeared. Dentply Sirona has the OsseoSpeed 3 mm implant (part of the Astra Tech Implant System) and the Xive 3.0 implant.

In 1976 already, the US Food and Drug Administration defined implants with a diameter of 3 mm and greater as conventional dental implants. In 1997, this agency defined implants with a diameter smaller than 3 mm as small-diameter implants. This mainly concerns one-piece implants used in very narrow jaws for a removable device or as an anchor for orthodontic appliances. These implants often consist of one piece owing to the fragility of the connection between the implant and abutment in such a narrow diameter. Unfortunately, they offer too few options for a crown because it is not possible to choose abutments with different angles for a perfect prosthodontic solution. Therefore, the practitioner has to choose an implant with a separate abutment. Most narrow implants have a conical connection between the implant and abutment. This connection is attached via a screw. Stress tests have shown that the screw is the most limiting factor with stress. A solid abutment and a conical connection with a Morse taper of sufficient length and a cone of between 15 and 4° result in a nearly leak-proof and rigid connection between abutment and implant. This is referred to as a “cold weld”. This makes such an implant almost as strong as a one-piece implant.

In this article, I discuss the treatment procedure of two patients I treated with 2.8 mm Axiom implants (Anthogyr) and present the final results.

Case 1

The first patient was referred to me by her dentist owing to a persistent tooth #53 (Fig. 5), which occasionally caused pain and had begun to exhibit mobility. Tooth #53 was congenitally absent, as was tooth #37, which I had already placed with an implant in a crown in 2011 (Fig. 3). At the time, the left side of the upper jaw still remained intact. By using a very sharp osteotome (Nentwig) as a guide, I determined the location (more palatally and direction of the preparation) (Fig. 3). I gently tapped the osteotome to approximately 8 mm (accounting for calibration) into the jaw bone, and by rotating it slightly, I achieved a good guide preparation. After this, I used the K-system (Dentak) for further preparation (Fig. 4). This set consists of a hollow drill shaft containing a grinder in which, during further preparation, the bone is collected and then used to fill the space around the preparation and the residual alveolar bone. I drilled to no more than two-thirds of the desired preparation length. The narrowest K-drill has a 3.2 mm diameter so that the preparation at the top is slightly wider than the 2.8 mm implant to be used. This allows one to adjust the implant somewhat in the axial direction if necessary. I used a 2.6 mm of the Anthogyr implant system (Fig. 5) to prepare to the correct length. The total length of the preparation was 15 mm, allowing placement of the implant 1 mm below the bone crest (Fig. 6). In this manner, very good primary stability is achieved (> 35 Ncm; Fig. 7).

After fitting a temporary abutment made of PEEK (Fig. 8), I fabricated a temporary composite crown. A PEEK temporary abutment is easy to construct using composite or temporary resin. This

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For a detailed visual representation of the implant placement and preparation process, please refer to the figures below:

**Fig. 1:** Initial situation with the strongly resorbed tooth #53 in situ.

**Fig. 2:** Dental panoramic tomogram showing the initial situation.

**Fig. 3:** The preparation was performed precisely using a Nentwig osteotome.

**Fig. 4:** The alveolar bone was ground and harvested using the K-system.

**Fig. 5:** The harvested bone was placed around the implant with the K-system.

**Fig. 6:** Radiograph after implantation.

**Fig. 7:** The FEAK abutment in situ.

**Fig. 8:** The Xive 3.0 implant.

**Fig. 9:** The PEEK abutment in situ.

**Fig. 10:** Dental panoramic tomogram showing the initial situation.

**Fig. 11a & b:** The preparation was performed using a 2.6 drill of the Anthogyr implant (Ankylos, Dentsply Sirona). At the time, I removed tooth #53 atraumatically. After fitting a temporary abutment with a transfer key (Fig. 12a), I fabricated a temporary composite crown. A PEEK temporary abutment is easy to construct using composite or temporary resin. This
A temporary abutment also has a 1.5 Morse taper, which provides good friction retention and does not damage the crown in the implant. Before placing the temporary crown, I applied the bone obtained in the hollow drill shaft on the buccal side and condensed it so that the alveolus was filled properly (Fig. 9). The temporary crown was shaped in such a way in the cervical area that the alveolus was completely covered. I checked that there was no functional stress (Fig. 10). At the follow-up a week later, good adaptation of the mucosa was already visible and the patient reported no problems.

After ten weeks, I removed the temporary crown and abutment. This is easy using crown removal pliers vertically. Using a pop-in impression coping, I took an impression in a closed tray. The laboratory then made the permanent crown. The temporary crown with PEEK abutment was easily repositioned. In this case, I arranged for the crown to be returned from the laboratory separately from the abutment. The construction then had to be fitted from the model of the mouth with a transfer key (Fig. 11a) because the structure is not identical, therefore, it can be cemented in several ways because there is no internal indexing, such as a trilobe or internal hex. After fitting the crown, which was ideal in both colour and shape, the structure was secured using the Safe Lock instrument (Anthony; Fig. 11b). This device is connected to the micromotor and produces short micro-strokes after activation using the foot pedal. Five strokes is sufficient to lock the abutment in place in the implant. The cold weld is then complete. I then cemented the crown accurately in the mouth with luting cement. At the six-month (Fig. 12a) and 20-month (Figs. 12b & 4) follow-ups, good adaptation of the mucosa was seen, and the results were considered to be good too.

Case 2

The second patient approached me at the suggestion of a dental student who had read an interview about my first experiences with narrow implants. The patient was no longer satisfied with the bonded bridge that replaced her tooth #22 owing to agenesis. She also found that the tissue increasingly approached the alveolar process that the alveolus was completely covered. I checked that there was no functional stress (Fig. 10). At the follow-up a week later, good adaptation of the mucosa was already visible and the patient reported no problems.

After six months, the patient returned to the practice and reported that she had not experienced any problems. I observed good adaptation of the mucosa (Fig. 15). After removing the temporary crown, which revealed an excellent emergence profile with healthy mucosa, I made a pop-in impression coping (Fig. 16). The laboratory again provided the structure with the separate crown. However, in this case, I decided to seat the crown as a whole after having fitted it satisfactorily and bonded it outside the mouth. This allowed me to avoid any embedding of cement residue (Fig. 17). However, I had to exercise greater care because I now had to tap the Safe Lock instrument directly on the zirconium dioxide porcelain crown to secure the abutment. A special attachment is available for this, which allowed fixture without any difficulties (Fig. 18). For this patient, I paid much attention to the cervical gingival line. Tooth #12 was a cone tooth constructed with composite, and it was too small. I corrected the patient’s cervical gingival line satisfactorily with an electro-tome and reconstructed tooth #12 with composite. This achieved a good result (Figs. 19–20b).

Discussion and conclusion

I inserted my first 2.8 mm implant in 2013. Initially, I had some doubts about implants of such small diameter and bad questions such as: Is the construction strong enough? Will it not break? Will the abutment–implant connection remain intact? However, although the use of such narrow implants remains a challenge, it has so far only yielded positive results. Nevertheless, I would like to make some remarks based on my experiences:

1. All of the major brand implant systems marketed narrow implants have paid much attention to the root shape of the implant with threads that have a condensing effect. This significantly increases the primary stability, which enhances osseointegration.

2. This primary stability also results in greater usability in immediate placement and provides the option of seating a temporary crown immediately.

3. The PEEK abutment used in this system has been proven to allow trouble-free retention over a longer time. Because in these cases, the implant was placed subcentrally and despite the small space, there was still enough surrounding bone. I observed good support of the mucosa and the presence of a good mucosal seal. In these cases, a 2.8 mm platform form was used as a superstructure with a platform switch. As a result, a proper emergence profile was achieved with the temporary crown.

4. Particularly with regard to reduced mesiodistal spaces, the use of an implant with a small diameter is a solution, but only in the aesthetic zone, where no extreme transverse stress will be placed on the implant.

5. I believe that with excessive stress and great forces, because the implant is so narrow, the abutment–implant connection could be a limiting factor.

6. The facio-lingual bone thickness is less restrictive in the application of a small-diameter implant because with several techniques, such as bone splitting and harvested autologous bone with the K-system or possibly with a bone graft, more volume can be created in a less invasive way. In order to achieve a good result, it is necessary for the practitioner to have the choice of various abutments. Therefore, one of the two-piece implant systems should be chosen. A narrow one-piece implant is less suitable for the aesthetic zone.

7. The solid connection between abutment and implant with the Morse taper connection is indeed strong and poses no risk of screw fracture, but there is no return. The implant becomes a one-piece implant with the solid abutment. By using Grade 5 titanium, strength is assured: extensive stress tests have been carried out up to 202 N. The positioning and permanent fixing of the restoration do require more attention than with a screwed abutment. For instance, a break in the crown may only be repaired by using the abutment for a new impression of the crown stump. It is unfortunate that only titanium abutments are available (owing to the strength). However, these are so narrow that there is enough body for the crown to make the restorations aesthetically pleasing.

The use of a narrow implant in a very limited space requires a well thought out diagnosis, great precision of work, and good use of and experience with different implant techniques. These cases were not treated using any guided surgery, but this could be recommended for precise implant positioning.