Dentist shortage to worsen

By DTI

HONG KONG/SINGAPORE: Owing to their growing and ageing populations, Hong Kong and Singapore are at risk of a serious lack of dentists in the years to come, experts have warned. Both are not equipped to meet the changing needs and demands of an increasingly older population with the current numbers of locally trained dentists.

According to a Hong Kong government report due to be released in the next several months, most of the city’s medical professions—including dentistry—will face shortages in the next ten years, the South China Morning Post has reported. Proposing solutions for the predicament, the report’s commission recommends increasing the number of overseas-qualified health staff working in public hospitals under limited registrations, among other measures.

To date, public hospitals in Hong Kong have been allowed to recruit foreign doctors under a registration scheme that is limited to one year. However, owing to stringent conditions that restrict foreigners from working in the private sector, only 12 medical professionals joined via the scheme last year, according to the Post. In order to address the predicted shortage of health care workers, these numbers would have to at least triple and contract terms be extended to attract more doctors, the report’s experts cautioned.

In Singapore, this situation is presently a lived reality in the dental profession. Here, foreign-trained dentists already made up the majority of new dentists registered in recent years. For example, in 2014, only 46 of the 187 newly registered dentists were local graduates, the Straits Times stated in an article.

Fighting implant infections

A team of researchers at KU Leuven in Belgium has developed a dental implant that gradually releases antimicrobial drugs to stop a biofilm forming on the surface and thereby help prevent infections. “Our implant has a built-in reservoir underneath the crown of the tooth,” explained lead author Dr Katri De Cremers.

The implant is made of a porous composite material, so that the drugs gradually diffuse from the reservoir to the outside of the implant, which is in direct contact with the bone cells. “So far, the implant has only been tested in the laboratory.

MI World Symposium

TOKYO, Japan: As host of the MI World Symposium in Tokyo on 5 February, Japanese dental manufacturer GC Corporation arranged an impressive scientific line-up to discuss the latest concepts in the field of minimal intervention dentistry. International and regional clinicians and researchers discussed various topics, including MI management strategies and materials solutions, as well as clinical aspects of the philosophy, taking into account parameters such as age, disease status and treatment options.

The company’s minimal intervention approach was developed based on an MI concept proposed by the FDI World Dental Federation in 1999 and introduced one year later in order to enable realisation of the concept in clinical practice, the GC Europe MI Advisory Board later developed the Minimal Intervention Treatment Plan.

Regionally connected

Through analysis of the teeth of two 7,700-year-old hunter-gatherer women discovered in a Russian cave, UK researchers found that their genetic make-up closely resembled that of modern-day populations in the region. This indicates that certain ethnic groups across north-east Asia have migrated very little for around eight millennia.

More free dental care

The University of Queensland is expanding its free dental care for disadvantaged populations owing to a new partnership with Metro North Hospital and Health Service. Through the alliance, which began in January, the university expects to be able to serve an additional 8,000 patients at its new oral health centre in Herston.
Atopic dermatitis linked to higher caries risk

New findings from a Singaporean study suggest that infants with atopic dermatitis might be at a higher risk of developing caries as toddlers.

By DTI

SINGAPORE: New research from the National University of Singapore (NUS) and the Singapore Institute for Clinical Sciences of the Agency for Science, Technology and Research has suggested a link between two common childhood diseases: atopic dermatitis and dental caries. In the study, infants who had symptoms of the skin condition and were sensitive to common allergens were three times more likely to develop tooth decay at 2 and 3 years of age compared with infants without the skin inflammation.

Atopic dermatitis, also known as atopic eczema or allergic, represents a chronic relapsing form of inflammatory skin disease that is characterised by symptoms such as itchy, red, swollen or cracked skin and a rash. Over the last year, the condition has been on the rise and affects approximately 15–30 per cent of children in developed countries today. As for dental caries, a 2009 NUS Faculty of Dentistry study found that four in ten preschool children in Singapore suffered from some form.

In the current study, which was part of the Growing Up In Singapore Towards Healthy Outcomes programme, the researchers interviewed about 500 parents during their child’s first year, at three, six and 12 months, respectively, to identify infants with eczema. Those children whose mothers reported them as having the skin condition were given skin prick testing to assess their sensitivity to common allergens.

The results showed that infants who had eczema and were sensitive to common allergens were 3.29 times and 3.09 times more likely to experience caries when they were 2 and 3 years of age, respectively, compared with infants without the dermatitis.

“Our latest findings will give parents and caregivers of babies with eczema early warning of increased risk of developing tooth decay in toddlers,” NUS researcher Dr Stephen Hsu told the Strait Times. “Regular dental check-ups can then be conducted to help minimise the incidence of tooth decay in these children.”

According to the research team, it is the first time a link between both conditions has been discovered. A possible mechanism behind the connection could be structural defects that occur during tissue development in the uterus. However, in order to confirm the underlying biological mechanism of the relationship, the researchers are now conducting further genetic analyses.

The study, titled “Atopic dermatitis and early childhood caries: Results of the GUSTO study”, was published online on 22 January in the Journal of Allergy and Clinical Immunology.
Increase in healthy life years through sugar, fat and salt taxes

By DTI

MELBOURNE, Australia: Modelling the effect of different combinations of taxes on sugar, salt and fat and a subsidy on fruits and vegetables on the death and morbidity rates of Australians, a new study has found that imposing a tax on sugar could avert about 270,000 disability-adjusted life years. In addition, the research estimated that, when combined to maximise benefits, taxes and subsidies could reduce the country’s health care spending by A$3.4 billion.

In the Western world, non-communicable diseases, such as obesity, diabetes, cardiovascular disease and dental caries, are mainly attributable to an unbalanced intake of fats, sugars and salt. In order to tackle the burden of those diseases, an increasing number of countries have already implemented or proposed taxes on unhealthy foods and drinks. However, the actual cost-effectiveness of levies and subsidies on certain nutritional items to reduce the burden of diet-induced diseases is uncertain and can only be estimated.

In the current study, researchers at the University of Melbourne simulated the effect of different combinations of taxes on unhealthy foods and a subsidy on fruits and vegetables based on the Australian population of 22 million in 2010. The model analysis set the sizes of the taxes and subsidy such that combined there would be less than a one per cent change in total food expenditure by the average household.

The results showed that a tax on sugar had the greatest impact among the taxes simulated. A sugar tax could avert 270,000 disability-adjusted life years (DALYS), the researchers calculated. DALYS are years of a healthy lifespan that are lost to disease. This equals a gain of 1.2 years of healthy life for every 100 Australians alive in 2010, which is a health outcome that few other public health interventions could deliver across the whole population, according to the researchers.

In comparison, a salt tax was estimated to save 150,000 DALYS, a saturated fat tax 97,000 DALYS and a sugar-sweetened beverage tax 50,000 DALYS. As for a fruit and vegetable subsidy, the study was unable to determine an isolated clear health benefit, although it was made for additional averted DALYS and reduced health sector spending, the researchers wrote.

The study adds to growing evidence of large health benefits and cost-effectiveness of using taxes and regulatory measures to influence the consumption of healthy foods. Based on the results of the models, the formulation of a tax and subsidy package should therefore be given more prominent and serious consideration in public health nutrition strategy, they concluded.

The study, titled “Taxes and subsidies for improving diet and population health in Australia: A cost-effectiveness modelling study”, was published online on 14 February in the PLOS Medicine journal.

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“A preventative health care system is also a cost-efficient health care system”

An interview with Prof. Jörg Eberhard, Australia

By Kristin Hübner, DTI

On the occasion of this year’s World Oral Health Day (WOHD) on 20 March, Prof. Jörg Eberhard from the University of Sydney will be presenting the Australian WOHD lecture, titled “Putting The Mouth in Health—Time for a paradigm change in dentistry!”. Dental Tribune had the opportunity to speak with Eberhard, who was appointed the university’s first Chair of Life-span Oral Health in 2015, about the role of preventative care in research and clinical practice and the general need for a more holistic view on medical conditions and oral health.

“Do you think that there should be an increased interdisciplinary exchange between dentistry and medicine?”

Prof. Jörg Eberhard: Research over the last several decades has shown that oral disease is linked to general health and other diseases, including cardiovascular disease, diabetes mellitus and rheumatoid arthritis. The available evidence demonstrating this association is based on epidemiological studies, clinical intervention trials and knowledge of sound biological mechanisms.

Irrespective of this body of knowledge, a holistic view on medical conditions that includes oral health has not been established in clinical medical practice.

In your opinion, concerning the prevention of oral health and prevention among the public, what role does the increasing use of highly advanced and complex technology in dentistry play in achieving the goal of retaining the natural dentition for as long as possible?

Prof. Jörg Eberhard: Highly advanced and complex technologies should be limited to those patients who have suffered trauma or who have severe disease or genetic deteriorations. Health care systems are not able to provide these technologies to the broader community and therefore these cost-intensive technologies are limited to the privileged. A preventative health care system is also a cost-efficient health care system, relieving individuals and the public from suffering and high costs.

In your opinion, concerning the promotion of oral health and prevention among the public, what will be the main challenges to modern dentistry be in the years to come?

The main challenge in the future for health professions will be to introduce the concept of a holistic health care approach based on preventative treatments rather than on therapeutic interventions.

Thank you very much for the interview.

Editorial note: Eberhard will be holding the 2017 WOHD lecture on 20 March from 5 p.m. to 7.30 p.m. at the Australian Dental Industry Association’s office in Al-esandra in New South Wales. Registration for the event is open at www.wohd.com.au/register.html.
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Deals collapses: Straumann decides against investing in MegaGen

By DTI

SINGAPORE: Having shared the management position with Michael Dreyer for an interim period since June 2016, Mathias Kuepper will now assume sole responsibility as Managing Director of Koelnmesse Pte Ltd in Singapore. The Asian subsidiary of German event organiser Koelnmesse was established under Dreyer in 2002 and organises leading dental events IDEM Singapore and the Association of Orthodontists (Singapore) Conference, among others.

“Due to the urgent need to expand in the fast-growing non-premium segment in China, India, Russia and Eastern Europe, we have invested in strong partners like Anthogyr, Equinox Me- dentika and Zinedent—in addition to Neodent. The Straumann Group brand, our shared technology platform and global network offer them considerable leverage and we are very excited about the opportunities that our partnership with them is creat- ing. Strategically, there is no longer a compelling need for a collaboration with MegaGen,” he added.

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DAEGU, South Korea/BASEL, Switzerland: Global dental implant manufacturer Straumann has announced that it will no longer be pursuing its plans to invest in or partner with the South Korean implant manufacturer MegaGen Implant. Instead of converting its US$30 million bond into MegaGen shares, the group has received full repayment in cash with interest.

In 2014, Straumann purchased convertible bonds from MegaGen and announced that it would be exercising its right to convert these bonds into shares to acquire a controlling stake in MegaGen in July last year.

After the announcement, MegaGen disputed the conversion price and calculation procedure, and despite significantly increased offers from Straumann, initiated arbitration under the International Chamber of Commerce rules. This could have taken up to two years, depending on the progress of the arbitration.

“The collaborative spirit of our relationship disappeared when MegaGen’s owners initiated arbitration. This and the corresponding long delay are not in the interest of either company and together with other recent developments make the business case unattractive,” explained Straumann CEO Marco Gadola.

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Koelnmesse Singapore: Mathias Kuepper assumes management position

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Paying tribute to Dreyer’s contribution to the company, Koelnmesse CEO Gerald Bösé acknowledged that Dreyer helped launch and sustain a substantial part of Koelnmesse’s internationalisation efforts right from the start and ultimately ensured the success of these efforts. Furthermore, Bösé said he was pleased to welcome long-standing staff member Kuepper as the new managing director of the Asia branch.

Kuepper, who is an economic geographer with extensive event and project management experience, has been working for Koelnmesse Singapore since 2002. Having been involved in the strategic business development in the Asian economic region for many years, he is set to focus on the implementation of Koelnmesse events in South East Asia and on the expansion of business activities in the local market.

With the change in staff, Koelnmesse’s centralised management performed by one regional centre for all of Asia will now be replaced with a market-specific decentralised organisational structure that works in close collaboration with the parent company in Cologne, the event organiser announced.

Mathias Kuepper

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Mathias Kuepper
Roland DG to establish new 3-D business brand, DGSHAPE

By DTI

HAMAMATSU, Japan: In order to increase visibility for its growing 3-D segment, Japanese manufacturer Roland DG has announced the transfer of its digital businesses, consisting of the development and sales of 3-D printing machines, 3-D printers, engraving machines and photographic impact printers, to a new, wholly-owned subsidiary, DGSHAPE Corporation. The spin-off, which begins operating in April, will be located at the Roland DG headquarters in Hamamatsu.

According to the company, its series of DWX dental milling ma-

chines has become a major driver of growth of Roland’s 3-D business, accounting for 60 per cent of sales in the segment in 2016. In addition, industrial inkjet printer sales accounted for 70 per cent of digital printing business sales in the same period.

Consequently, the company decided to embark on restructur-

ing its dentistry-focused 3-D business by launching it under the new brand of DGSHAPE and transferring it to an autonomous company.

“Spinning the 3-D business off as a separate company would allow the management of DGSHAPE to implement speedy decision-making and business execution,” commented Roland DG President Hidenori Fujisaka on the decision to transfer the business to a new subsidiary. “Led by a young executive team—Representative Director, President and CEO Kohji Tanabe is 39 years old—I hope DGSHAPE will advance the innovative concept of 3-D digital fabrication, exploit next-generation technologies, and take bold steps to develop cutting-edge products and solutions.”

In addition to Tanabe, Hau Siah Bito will serve as Director and Chief Technology Officer, Kouichi Hashimoto as Outside Director, and Toru Kajikawa as Audit and Supervisory Board Member. The executive board will be formally appointed at an extraordinary general meeting in March.

META BIOMED launches EQ-V

By DTI

HAMAMATSU, Japan: SEOUL, Korea/MÜHLHEIM, Germany: META BIOMED has now established its European headquarters in Mülheim in Germany and, with the move, the Korean medical technology company is aiming at increasing its presence throughout Europe. META BIOMED has a deserved reputation of being one of the dental industry’s primary innovators, as the company’s focus on research and development has achieved continual breakthroughs in the quality and performance of its medical devices and biomaterials. The focus of improvement through innovation continues with the launch of META BIOMED’s new EQ-V endodontic obturation system, which promises to deliver reliable, convenient and precise root canal obturation.

The decision to base META BIOMED in Mülheim has been warmly welcomed by local economic development agency NRW.INVEST, both of which have supported META BIOMED throughout the expansion process. As a company with more than 1,000 employees worldwide, establishing itself in Germany is recognition of the “made in Germany” label as an international signifier of high quality. This emphasis on providing exceptional products reflects the company’s own corporate ethos.

META BIOMED’S EQ-V is a brand-new system that offers a revolutionary and convenient option for continuous wave obtura-

tion. With the user in mind, both the EQ-V Pack and Fill are lightweight and ergonomically designed to allow for comfortable handling. Each is protected with chemically proven housing material and offers outstanding heating performance, as the fill needs just 35 seconds to reach a temperature of 200 °C. A highly efficient and replaceable lithium battery ensures that the EQ-V has an extended battery time, making it ideal for longer and more complicated procedures. The device’s unique 360° rotating cartridge provides dental professionals with unparalleled access and precision, and comes with the added benefit of being easily replaceable and disposable. All in all, the EQ-V is a product that embodies META BIOMED’S commitment to providing low-cost, high-quality solutions for everyday dental procedures.

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Next-generation laser system launched

By DTI

HELSINKI, Finland: Owing to their compact size and precision, Finnish dental manufacturer Planmeca’s scanning systems have not only advanced daily dental practice in recent years, but also helped fossil research to go digital. Visiting the Finnish Museum of Natural History, the company met with prominent researchers to learn how digital technology is used to unlock the past of fossilised teeth and bones.

Back in 2015, Prof. Jukka Jernvall, an evolutionary development biologist researcher at the University of Helsinki, was in need of a suitable device for his latest project, researching the history of Saimaa ringed seals and the development of their teeth. For this, Jernvall was seeking a way to digitally record sets of teeth. However, the imaging tools that were available to him then were slow and their accuracy left much to be desired. Consequently, he contacted Planmeca to request the use of the company’s PlanScan intra-oral scanner for his purposes.

According to Planmeca, the scanner quickly proved itself both fast and accurate, and its compact size made it easy to carry along to any research site. After this successful initial cooperation, the Planmeca Romexis software was fine-tuned at the university for research on the teeth of ringed seals.

Speaking with Planmeca Marketing Communications Specialist Sanna Tollesen, researcher Dr Jacqueline Moustakas-Verho explained that teeth are an excellent subject for researchers of evolutionary and developmental biology because, once the teeth have formed, they change shape only by wear. Originally from the US, Moustakas-Verho moved to Finland six years ago to study fossilised teeth. “The University of Helsinki is one of the leading institutions in the world on fossil teeth research. People come here to investigate teeth from all over the world, like France and Japan,” she said.

Among the subjects examined using Planmeca’s 3D imaging devices and software so far is the study prehistoric life have been the teeth of pandas, ancient cave bears and polar bears, and even the tiny teeth of mice and ancient vampire bat skulls that are so small and thin that most scans are unable to process them.

According to the museum’s senior technician, Janne Granroth, most researchers who visit the museum use the Planmeca technology for their projects. “One day we hope to have systematically digitised our entire collection. Ideally, we would eventually have an online system where the serial number of every sample would correspond to a digital impression. Still, this would enable us to share the material with researchers all over the world.”

3Shape’s new lab scanners

By DTI

CHICAGO, USA. Digital dentistry specialist 3Shape has launched a new line of cost-effective scanners for the dental laboratory. According to the company, the E scanners deliver high-quality images and offer advanced scanning features and precision CAD/CAM workflows, like other 3Shape scanners, but at a more affordable price.

The E scanners feature two megapixel cameras each, Blue LED and multline high-speed scanning for optimal detail capture and accuracy and thus enable laboratories to complete more cases in less time. Moreover, features like 3Shape’s reliable impression scanning, which allows laboratories to scan conventional impressions directly without having to pour a model, and Auto-start, which starts scanning as soon as the model is placed inside the E scanner, save additional time and costs.

Planmeca intra-oral scanning systems help promote fossil research

By DTI

IRVINE, Calif., USA: BIOLASE, a global leader in dental lasers, has announced that its new Waterlase Express all-tissue laser system has received 510(k) clearance for commercial distribution from the Food and Drug Administration (FDA). The product is now available for sale to dentists in the US, as well as selected international markets in Europe, the Middle East and Asia.

Waterlase Express represents the newest addition to BIOLASE’s Waterlase product line of YSGG all-tissue lasers and the fifth-generation laser of the most widely used all-tissue dental laser wavelength. Waterlase Express, which was exhibited for the first time at the Midwinter Meeting of the Chicago Dental Society in February, will be unveiled internationally at the International Dental Show in Cologne, Germany, the world’s leading trade show for the dental industry, to be held from March 21 to 25.

The system was designed based on extensive qualitative and quantitative research by a team of dentists around the world. According to BIOLASE, Waterlase Express represents the new foundation of the company’s strategy to greatly expand all-tissue laser use in dentistry.

“We are excited to launch the Waterlase Express, our next-generation Waterlase system designed for easy and intuitive operation, integrated learning, and portability. We believe the Express user interface is to legacy laser user interfaces what the Apple iPhone was to the flip phone,” said Harold C. Flynn Jr., President and CEO of BIOLASE.

“Express will enable significantly higher penetration and adoption of all-tissue laser dentistry worldwide. With all the value of Waterlase technology at nearly one-quarter the size, one-third the weight, and nearly half the US retail price of our market-leading Waterlase iPlus system, we believe Express is the dental laser that is finally ready for the vast majority of dentists around the world, many of whom have waited to integrate our all-tissue laser solutions into their practices.”

3Shape’s new affordable E scanners make advanced CAD/CAM accessible to laboratories of all sizes.

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According to Planmeca, the scanner quickly proved itself both fast and accurate, and its compact size made it easy to carry along to any research site. After this successful initial cooperation, the Planmeca Romexis software was fine-tuned at the university for research on the teeth of ringed seals.

Speaking with Planmeca Marketing Communications Specialist Sanna Tollesen, researcher Dr Jacqueline Moustakas-Verho explained that teeth are an excellent subject for researchers of evolutionary and developmental biology because, once the teeth have formed, they change shape only by wear. Originally from the US, Moustakas-Verho moved to Finland six years ago to study fossilised teeth. “The University of Helsinki is one of the leading institutions in the world on fossil teeth research. People come here to investigate teeth from all over the world, like France and Japan,” she said.

Among the subjects examined using Planmeca’s 3D imaging devices and software so far is the study of prehistoric life have been the teeth of pandas, ancient cave bears and polar bears, and even the tiny teeth of mice and ancient vampire bat skulls that are so small and thin that most scans are unable to process them.

According to the museum’s senior technician, Janne Granroth, most researchers who visit the museum use the Planmeca technology for their projects. “One day we hope to have systematically digitised our entire collection. Ideally, we would eventually have an online system where the serial number of every sample would correspond to a digital impression. Still, this would enable us to share the material with researchers all over the world.”

3Shape’s new affordable E scanners make advanced CAD/CAM accessible to laboratories of all sizes.

By DTI

CHICAGO, USA. Digital dentistry specialist 3Shape has launched a new line of cost-effective scanners for the dental laboratory. According to the company, the E scanners deliver high-quality images and offer advanced scanning features and precision CAD/CAM workflows, like other 3Shape scanners, but at a more affordable price.

The E scanners feature two megapixel cameras each, Blue LED and multline high-speed scanning for optimal detail capture and accuracy and thus enable laboratories to complete more cases in less time. Moreover, features like 3Shape’s reliable impression scanning, which allows laboratories to scan conventional impressions directly without having to pour a model, and Auto-start, which starts scanning as soon as the model is placed inside the E scanner, save additional time and costs.

Planmeca intra-oral scanning systems help promote fossil research

By DTI

HELSINKI, Finland: Owing to their compact size and precision, Finnish dental manufacturer Planmeca’s scanning systems have not only advanced daily dental practice in recent years, but also helped fossil research to go digital. Visiting the Finnish Museum of Natural History, the company met with prominent researchers to learn how digital technology is used to unlock the past of fossilised teeth and bones.

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The field of tissue engineering has exploded during the last decade

An Interview with Dr Ibrahim Abu Tahun, Jordan

By Kristin Hübner, DTI

Being actively involved as a founding member and president of several endodontic societies, Dr Ibrahim Abu Tahun has experienced the changes in the field significantly over the last decades. Dental Tribune had the opportunity to speak with Tahun, who is an associate professor in the Department of Conservative Dentistry at the University of Jordan, about the most influential developments in the specialty and how these advances are changing the way endodontics is practised.

Dental Tribune: Dentistry is changing rapidly, with new materials, devices and treatment protocols being introduced constantly. What is the situation in endodontics in particular? What are the major developments currently?

Dr Ibrahim Abu Tahun: At the beginning of the 21st century, we have greater understanding of the pulp biology: pathophysiology and its powers of healing. The field of tissue engineering has exploded during the last decade, and extensive reviews on dental applications are available, producing a critical mass of knowledge and methods that are likely to answer the challenge issued decades ago.

Various animal and human studies have shown high success rates for vital pulp therapy. These investigations have demonstrated convincingly in humans that this type of environment may create the ideal clinical outcome if disinfection can be achieved, just as it is for the canals in the case of dental avulsion. In the past, it was unthinkable that the tissue in the periapical region of a non-vital infected tooth could regenerate. Case reports published during the last 15 years have demonstrated convincingly in humans that type of environment may create the ideal clinical outcome if disinfection can be achieved, just as it is for the canals in the case of dental avulsion.

What are the advantages of new treatment modalities compared with conventional root canal therapy?

The potential benefits to patients and the profession are ground-breaking. From a public health point of view, the recent advances in tissue management and wound healing, compared with the current form of root canal therapy, which is more of a mechanical and chemical process, should be reflected in our clinical management to develop more biocompatible treatment modalities and increase tooth longevity. In the past, it was unthinkable that the tissue in the periapical region of a non-vital infected tooth could regenerate. Case reports published during the last 15 years have demonstrated convincingly in humans that this type of environment may create the ideal clinical outcome if disinfection can be achieved, just as it is for the canals in the case of dental avulsion.

When it comes to implementing new treatment modalities in daily practice, do you think the endodontic community is somewhat divided or is the specialty as a whole on the verge of a major paradigm shift?

The debate on clinical technique and the concept of regenerative and revascularisation per se is not a product of modern medicine. The varying treatments for the tooth pulp during the last three centuries illustrate this clearly. Recently, various treatment concepts have been suggested using less-invasive approaches. Even though an optimal treatment protocol is lacking, however, many case reports and case series on pulp therapy have been published.

Once considered taboo, vital pulp treatment of symptomatic permanent teeth with mineral trioxide aggregate has been reported to be successful, and greatly improved prognoses for permanent retention are now possible. More high-quality cohort studies would strengthen the evidence-based recommendations. However, the current best available evidence allows clinicians to provide these treatment modalities safely to patients. Globally, what is necessary to implement this new approach to endodontic treatment?

A reparative, biological approach to pulp therapy is not only welcome, but also absolutely essential. Ideally, the delivery of biologically based endodontic procedures must be more clinically effective than current treatments and the method of delivery must also be efficient, cost-effective and free of health hazards or side-effects for patients. A recent study has suggested that endodontic practitioners are supportive and optimistic about the future use of regenerative endodontic procedures.

In your opinion, what innovations will influence endodontists most in the years to come?

The tremendous and exciting new research on regenerative endodontics from Japan, the US and other countries has made the cultivation of potential in this field a strategic priority without undermining the efficacy of conventional endodontic therapies, but positioning practitioners at the forefront of this field.

We are changing protocols, towards going biological. This path to the future with various potential approaches based on clinical and scientific results presented in the professional literature will lead to predictable conservative treatment that may enable practitioners to fill a root canal with nature’s tissue instead of plastic materials or artificial surgical prostheses. The important challenge facing us now is to develop and adapt a safe, effective and consistent method for regenerating a functional pulp–dentine complex in our patients.

Thank you very much for the interview.

Editorial note: At the 19th Scientific Congress of the Asian Pacific Endodontic Confederation, which will be held from 5 to 8 April in New Delhi in India, Tahun will be addressing current endodontic challenges and conflicting priorities between conventional therapies and new treatment modalities in his lecture “Can we do it forever?”.

“In the past, it was unthinkable that the tissue in the periapical region of a non-vital infected tooth could regenerate.”

The desire for aesthetically pleasing, minimally invasive and perfectly harmonious anterior restorations has existed since the beginning of dentistry. Only recently, however, has it become possible to translate this desire into reality. For many years, dentists struggled with the opacity of porcelain-fused-to-metal crowns before all-ceramic crowns became available. However, these ceramic materials were not sufficiently durable to be suitable for less invasive indications. Finally, ceramic veneers were launched.

Veneer preparations are far less invasive than crown preparations—some preparation is nonetheless still needed. In addition, the veneers have to be designed in such a way that they cover the entire buccal surface. However, given the advancements in ceramic technology and the luting composites available today, it is now possible to use partial veneers and to seat them without any difficulty.

**Partial veneers**

Partial veneers are ceramic veneers that only cover that part of the tooth that is missing, broken off or abraded. As a result, the tooth needs only partial preparation or none at all.

This approach has become feasible for two reasons:

1. New ceramic materials are available: Dental technicians now have the option of layering any ceramic restoration. They can choose to use a fluorapatite ceramic material such as IPS e.max Ceram (Ivoclar Vivadent) or to press the restoration from a highly translucent ingot such as the Opal or HT ingots of the IPS e.max Press range (Ivoclar Vivadent).

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**Adhesive cementation of partial veneers**

Achieving highly aesthetic results in the anterior region

By Dr Eduardo Mahn, Chile

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**Fig. 1:** Pre-op situation. **Fig. 2:** Close-up of the pre-op situation. **Fig. 3:** Prepared teeth. **Fig. 4:** Selecting the shade of the luting composite: Variolink Esthetic LC in shade warm. **Fig. 5:** Try-in of both partial veneers. **Fig. 6:** Before seating the veneers: the adjacent teeth were covered with PTFE tape and separated with a mylar strip. **Fig. 7:** Enamel etching for 20 seconds. **Fig. 8:** Dentine etching for 10 seconds. **Fig. 9:** Rinsing with a water spray. **Fig. 10:** Applying the Adhese Universal bonding agent. **Fig. 11:** Close-up of the bonding procedure. **Fig. 12:** Applying Variolink Esthetic LC warm to the partial veneers. **Fig. 13:** Seating the partial veneers. **Fig. 14:** Careful removal of excess cement using a brush. **Fig. 15:** Light curing for 5 seconds from both sides. **Fig. 16:** Final light curing with two Bluephase Style lights while cooling the teeth with a water spray. **Fig. 17:** Excess removal using a scalpel. **Fig. 18:** Post-op view. **Fig. 19:** Close-up of the final result after four weeks.
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TRENDS & APPLICATIONS

The ceramic material selected for a restoration depends on the size of the defect and/or the optical effects and stability that the dentist intends to achieve. The layering technique is likely to be the first choice for teeth featuring multiple optical effects. If large partial veneers that do not require special effects, but include the entire incisal edge, are required, a high-strength ceramic such as lithium disilicate is a likely choice.

When it comes to selecting a luting material for full veneers and partial restorations, Variolink Veneer (Ivoclar Vivadent) is bound to be the first choice for many dentists. Not long ago, the successor product, Variolink Esthetic, was launched. This luting material is available in a dual-curing and light-curing version. The Effect shade concept on which the five shades of the product are based enables the dentist to adjust the shade effect of the restoration to make it appear warmer or lighter, as required. In addition, the shade effect can be checked prior to the final cementation with the help of try-in pastes in the corresponding Effect shades. The composite contains the newly patented photoinitiator Ivocerin, which provides the cement with long-term shade stability. In addition, Variolink Esthetic is easy to use owing to its flexible situational consistency and easy clean-up characteristics.

Clinical case

A 46-year-old male patient visited our practice with the request to have his 20-year-old Mirage partial veneer replaced. He felt that the veneer needed replacing because of the wear of the adjacent central incisor (Figs. 1 & 2). It was decided to use partial veneers to improve the situation. Figure 3 shows the preparation performed on the teeth.

Once we had received the veneers (IPS e.max Press HT) from the laboratory, we used the Variolink Esthetic try-in pastes to determine a matching cement shade for the final cementation. In this specific case, we achieved the best result with the shade Warm (Figs. 4 & 5). Next, the adjacent teeth were covered with PTFE tape and a mylar strip was placed between the teeth (Fig. 6). The enamel was then etched for 20 seconds and the dentine for 10 seconds (Figs. 7 & 8), followed by rinsing with water (Fig. 9).

Afterwards, Adhese Universal (Ivoclar Vivadent) was rubbed in and allowed to react for 10 seconds (Figs. 10 & 11). Variolink Esthetic LC Warm was applied to the partial veneers before they were seated (Figs. 12 & 13). Excess cement was carefully removed with a brush before light curing (Fig. 14). The veneers were then illuminated simultaneously from both sides for 30 seconds using two Bluephase Style curing lights (Ivoclar Vivadent; Fig. 15).

In order to save time, final curing was also conducted using the two Bluephase Style lights, as each side had to be light-cured for 30 seconds (Fig. 16). Since light curing for this length of time with two curing lights operating at a light intensity of 1,100 mW/cm² may result in considerable heat build-up, there is the potential risk of damage to the pulp. It is therefore prudent to cool the teeth with a water spray, as shown in Figure 16. After light curing, remaining excess cement was removed using a scalpel (blade no. 12; Fig. 17). The final result after four weeks is shown in Figures 18 and 19.

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Using the operating microscope and ultrasonics for root canal preparation

By Dr Anthony C.S. Druttman, UK

Introduction

The purpose of preparing the root canal system is well understood, and contemporary techniques involve the use of both hand and rotary instruments, in conjunction with an irrigation regime. However, the complexity and variability of root canal morphology can make effective preparation very challenging, particularly in canals with irregular cross-sections.

Current techniques are not always completely effective, and it has been well recognised that, while some parts of the root canal are over-prepared with rotary instrumentation, other surfaces are not touched. One study concluded that at least 35% of the surface area of canals had remained untouched by rotary preparation.¹ Another study showed that the results were even worse: 60–80% of untreated surfaces were left in the distal canals of mandibular molars, with 65–75% in the apical 4 mm after preparation.² Oval canals are particularly challenging, as the debris collects in the extensions and isthmuses (Figs. 1a & b). A review of preparation techniques states that “because of limited efficacy of irrigation in such recesses, debris and smear layer may accumulate and remain on these un-prepared root canals walls, decreasing the quality of obturation and jeopardise the long-term treatment success.”³

Preparation of root canal system

The cause of failure of endodontic treatment has been attributed to the presence of microorganisms persisting in the apical part of the root canal.⁴ Much attention has therefore been focussed on preparation and obturation of the apical part of the canal, thereby depending on the apical seal to prevent toxins from leaking out into the periapical tissue. While success rates of endodontically treated teeth without periapical lesions are very high, there can be a significant reduction in success in teeth with periapical periodontitis and in those teeth in which endodontic treatment has failed.¹ This is predominantly due to the failure to remove microbes from the root canal system. The quest is to find more effective irrigants and irrigation techniques, as well as rotary files and preparation techniques, to overcome these difficulties.

An ideal preparation shape with a rotary instrument can only be achieved in a canal with a matched cross-section. Many canals are variable in shape. They may have irregular and oval cross-sections, and while much of the debris is captured within the flutes of the instruments, some is compacted into those spaces between the instrument and the wall (Fig. 2). The incidence of isthmuses in both maxillary and mandibular first molars is very high.⁵ They are particularly liable to have an accumulation of compacted debris after preparation, and the inability to clean these areas effectively has been implicated as a major cause of failure of root canal treatment, particularly in mandibular and maxillary first molars (Fig. 3).⁶⁻⁷

The more the debris is compacted, the more difficult it is for chemicals such as sodium hypochlorite and calcium hydroxide to penetrate through the interface. Paque et al. reported that approximately half of the debris that accumulated during rotary instrumentation of the mesial canals of mandibular molars remained in the canal system after irrigation.⁸

Failure of endodontic treatment in maxillary molars has been attributed to the failure to locate and treat the second mesiobuccal (MB2) canal.⁹ Various studies have shown the presence of the MB2 canal in up to 90% of maxillary first molars. Summa et al. showed that, in 58% of teeth, the MB1 and MB2 canals merge apically into one canal.¹⁰ In a proportion of these failed cases in which the MB2 canal has been located, cleaned, shaped and obturated, the question should be asked whether the failure was due to inadequate treatment of the apical part of the MB1 canal or because the MB2 canal and isthmus between the two canals had been missed. Identification and treatment of the MB2 canal with concomitant retreatment of the MB1 canal often lead to healing. This suggests that the seals are not always good enough to entomb the bacteria. Indeed, coronal microbiolakeage has been implicated as a major cause of failure of endodontic treatment.¹¹ Undoubtedly, tracts of debris running alongside root fillings are conduits for bacteria to cause failure by this method.

In an in vivo study, the mesial canals of sixteen mandibular molars with infected root canals were root-treated by conventional techniques in a single visit and the apical portions removed by flap surgery and evaluated by corrective light and transmission electron microscopy.¹² In the majority of cases, residual microbes were located in inaccessible recesses, un-instrumented areas of the main canals, accessory canals and intercanal isthmuses. If the lateral extensions feed into the apical part of the canal, then removing bacteria and nutrients from these areas reduces the bacterial load and this has to be beneficial for the outcome of treatment. A variety of techniques have been proposed to overcome the inadequacies of mechanical preparation in non-circular canals, including circumferential filing using both hand and rotary files and the use of a rotary self-adjusting file (SAF) that adjusts to the shape of the canal. The SAF system has been shown to be more effective in cleaning oval canals than conventional rotary nickel–titanium instruments, however, in De Deus et al. using mandibular canines, even this technique did not render the canals completely clean.¹³ They showed that rotary files were unable to access the recesses of oval canals and that sodium hypochlorite had a “limited ability to compensate for the inadequacy of the file itself”.¹⁴ They further suggested that the common belief that “the file shapes, the irritant cleans” is based more on wishful thinking than on experimental facts. In a review article, it was recognised that SAF was unable to prepare the narrow isthmus of less than 0.2 mm.¹⁵ In the case of the narrow isthmus, the challenge is to deliver sufficient quantities of irrigant effectively into a very small area in which debris has been compacted during preparation.

Recently, new concept files XP-3D Finisher (Brassler) that change their shape with temperature have been developed with the expectation that they can deal with canal irregularities. While these may be helpful in removing soft tissue in non-circular canals, they may be of limited value in situations in which tissue or root filling materials are strongly adherent to the root canal wall.

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Fig. 1a: Debris left after root canal treatment of the distal canal of a mandibular molar. Fig. 1b: Radiograph of the failed root canal treatment shown in Figure 1a. Fig. 2: Oval-shaped canal in the apical third of the distal root of a mandibular molar. Fig. 3: Debris accumulated after preparation in the isthmus between the mesial canals of a mandibular molar. Fig. 4: Acoustic micro-streaming patterns produced by an ultrasonically energised K-type file. Fig. 5: Inspection of a prepared oval-shaped distal canal of a mandibular molar reveals residual debris apically.
Ultrasonics have played a role in endodontics for many years. Initially, ultrasonic canal preparation was introduced by Richman in 1957, and in subsequent years, there was a vogue for using the ultrasonically energised file to cut dentine in root canals. The technique fell out of favour because lack of control produced ledges, apical perforations and instrument separation. In the 1980s, research showed that passive ultrasonic irrigation (PUI) cleaned canals more effectively than ultrasonic irrigation with simultaneous instrumentation (UI), where the file is intentionally brought into contact with the canal wall. PUI uses an ultrasonically energised file to irrigate the canal and to remove debris utilising a combination of acoustic micro-streaming and cavitationary energy (Fig. 4). Since the introduction of the operating microscope, it has been possible to carry out endodontic treatment at varying magnifications, up to approximately 25×, with the aid of direct light that can penetrate into the depths of the root canal. This means that visual inspection of the prepared root canal is possible. Once the canal has been shaped by conventional techniques and dried, the canal can be visually inspected both apically and laterally into the extensions of the canal. Straight canals can be inspected to the apical constriction. Since rotary files straighten the coronal and middle thirds of curved canals, most of these prepared canals can be inspected to within a few millimetres of their full working length. Inspection through the microscope at about 10× and above can identify those parts of the canal system that have not been touched by the rotary files and contain residual debris (Fig 3). These are usually the extensions of oval and flattened canals, isthmuses and fins. The challenge is to prepare these areas to produce a smooth, predictable shape without removing excessive tissue, allowing irrigants to penetrate into the canals more fully and therefore producing cleaner canals. Our expectations are that delivery into these parts of the canal anatomy of irrigants and medicaments using a variety of techniques will digest residual tissue material and entomb remaining bacteria, rendering them ineffective. While they have undeniable advantages in the parts of the canal system that cannot be inspected under the microscope, a significant part of the bacterial load within the canal can be removed by the use of a cutting instrument directed towards a specific part of the root canal, such as a fin or isthmus. In the coronal part of the canal, this can be done with either a long-shank rosehead bur or a dedicated ultrasonic instrument. Long-shank burs are very limited in their use, however, because of the length of the shank, relatively large diameter of the bur, lack of visual access and their limitation to use in the straight part of the canal. In the deeper parts of the canal, ultrasonically activated instruments can be used to great effect. 

Fig. 6: An ultrasonically energised K-type file used to prepare an isthmus under the operating microscope.
A very effective solution is to use an ultrasonically energised K-type file (UEKF), the very instrument that was discarded after the problems identified with ultrasonic instrumentation in the 1980s. The difference between then and now is that, in conjunction with the operating microscope, the instrument can be used with a great deal of control. Furthermore, power settings have been considerably reduced to minimise the possibility of instrumentation. In many situations, the UEKF overcomes many of the limitations presented by other ultrasonic instruments.

The file can be curved in multiple directions so that the head of the ultrasonic handpiece does not impede visual access and the file can be shaped to follow the curvature of the canal. When used in conjunction with the operating microscope, the file can be directed to the part of the canal that has not been prepared by the rotary files. A size 20 UEKF with a 2% taper is an optimal size, although a larger file may occasionally be used. Because the file is relatively flexible and removes only 0.2 mm of dentine, unnecessary removal of dentine is kept to a minimum (Fig. 6).

The file works in multiple ways: it can easily be pre-curved to follow the canal curvature and can be used as either a cutting instrument by engaging the tip or as a planing instrument by using the flutes along its working length. When used as a planing instrument, it can be used with variable pressure against the walls of the canal, such as in an oval canal extension or in an isthmus. The greater the pressure applied, the more effectively the file cuts dentine, in the same way as a hand file, at the expense of the ultrasonic effect. As the pressure on the file is reduced, so the ultrasonic effect is increased, achieving the benefits of PUI. The effectiveness of this technique is enhanced both by the flexibility of the K-type file so that it can be pre-curved and by its rigidity so that it can cut efficiently into a targeted area. The instrument can be used in both modes interchangeably just by varying the lateral pressure placed on the ultrasonic handpiece.

In endodontic retreatment cases, both the UEKF and the dedicated ultrasonic tips can be used to great effect to remove endodontic obturation materials, separated instruments and posts using minimally invasive techniques. While the UEKF has to be used at low power settings to minimise the possibility of fracture, it allows for excellent visual control. Dedicated ultrasonic tips, such as the Endo-Sucess ET 25 tip (Satelec), can be pre-curved to improve visual access and can be used at higher power settings. It is, however, only effective at its tip. This tip is particularly useful for removing separated instruments. Other ultrasonic tips that cannot be pre-curved can only be used in straight parts of the canal.

The removal of gutta-percha from oval canals often presents a challenge, as rotary instruments are not completely effective. A rigid ultrasonic tip is more likely to plastific the gutta-percha, while the UEKF, with its increased tip amplitude, fragments the material.

**Conclusion**

Both ultrasonics and the microscope have become essential parts of the armamentarium in endodontics. When used together, they can produce minimally invasive preparations, which produce cleaner canals in both primary and retreatment cases. Conventional irrigation strategies should always be employed, particularly in those areas of the canal system that cannot be visually inspected with the operating microscope, such as in the curved apical third. However, the technique described in this article can aid in the reduction of the bacterial load within the canal system and this can result in more predictable outcomes.