European Commission reviews environmental aspects of mercury in dental fillings

Yvonne Bachmann

HONG KONG: The European Commission has decided to examine the risks of using mercury in amalgam fillings. As some member states have already restricted the use of dental amalgam substantially, the Commission wants to assess this issue in detail with due consideration of all relevant aspects of its life cycle. The study is to be concluded in June 2012.

The focus of the study is on the environmental rather than on the health aspects of dental amalgam. While scientific debate on the potential health effects of the use of dental amalgam is still controversial, the need for proper management of dental amalgam waste is not disputed. It is expected that a significant quantity of mercury originating from dental fillings, estimated at over 1,000 tonnes for the entire EU population, will probably ultimately end up in the environment, e.g. by release into the soil via burial, or even by direct emission into the atmosphere following cremation, unless relevant policy measures are considered.

Dental Tribune Asia Pacific has learned that the Commission recently awarded a contract to a consultant to investigate the current situation in relation to the quantity of mercury used in dental amalgam in the EU and identify measures that could reduce its environmental impact.

The study's findings will be presented and discussed during a workshop in Brussels in March 2012 and potential stakeholders will have the opportunity to give feedback. According to the European Commission, interested parties are welcome to provide input during the process and express their interest in participating in the workshop.

The Commission will take the results of the study into account, as well as relevant international developments, before proceeding with potential policy measures.

Under the auspices of the United Nations Environment Programme, discussions on the reduction of mercury use are also taking place internationally. Negotiations, in which the European Commission represents the EU, started in 2010 and shall be completed by 2013. Dental amalgam is amongst the products currently discussed as potential candidates for being regulated.
NZ opposition says it’s time for universal dental care

Labor party welcomes Progressive proposal on free dental services

Daniel Zimmermann

HONGKONG: The Progressive Party in New Zealand has introduced a new dental health policy paper that aims to extend free dental health care from youngsters to all people in the country. The paper proposes a reduction of tax cuts and a new levy on soft drinks to raise the estimated additional costs of more than NZ$500 million (US$407 million) for the scheme.

Other recommendations include shifting authority for water fluoridation from local to central government, as well as extending the voluntary bonding scheme to dental professionals in the country’s neglected rural areas.

According to the last national Oral Health Survey conducted in 2009, almost half the adults in New Zealand do not visit a dentist owing to cost. It also found that the majority of people only seek dental care when they have a dental problem rather than attending for regular check-ups. The country currently provides free dental care to those under 18 years of age. Treatment of adults however is not subsidised.

Progressive leader and former Deputy Prime Minister Jim Anderton said that free access to dental services should first be extended to vulnerable groups like pregnant women and the elderly, followed by those aged between 18 and 28, then 28 and 50, and members of the baby-boomer generation.

“This plan could be implemented over a period of five to ten years so that funding administration and resources required could be accommodated more efficiently,” Anderton stated.

Representatives of Labour, the main opposition party, commented in favour of the policy paper, which they said would be considered a priority should the party assume government after the general elections in November. They also said that the neglect of dental services under the current National government has led to a dangerous reduction in oral-health outcomes.

Representatives of the Ministry of Health and the New Zealand Dental Association refused to comment on the proposal.
Sing university appoints new executives to strengthen medical and dental cooperation

Daniel Zimmermann

HONG KONG: In an effort to enhance synergies between medical and dental research and education, the National University of Singapore (NUS) has appointed three senior academics to leading posts in the university's key health education bodies. Prof. Benjamin Ong, senior neurologist and incumbent Chief Executive of the National University Health System, a public joint venture that oversees the operations of all health-related institutions, including the Faculty of Dentistry, has announced that he will be assuming the duties of Senior Vice-President of Health Affairs from July.

In addition, Prof. Yeoh Khay Guan, a renowned cancer expert, will become Dean of the Yong Loo Lin School of Medicine, the university's medical school. He will succeed Prof. John Wong Eu Li, who has been appointed Vice-Provost for Academic Medicine. NUS President, Prof. Tan Chorh Chuan, welcomed the appointments, which he believes will further integrate health education and research with clinical practice and patient care, and have great impact on future medical and dental education in Singapore and other countries.

The NUS has one of the oldest and largest dental schools in South-East Asia.

Penn receives millions for Korean studies

From news report

PHILADELPHIA, USA: University of Pennsylvania School of Dental Medicine (Penn) President Amy Gutmann recently announced a US$7.5 million gift from alumni in support of Penn's Korean Studies Program. She also signed a memorandum of understanding between Penn and Seoul National University (SNU), Korea's oldest national university.

The memorandum of understanding will facilitate further collaborative research projects and other academic activities, including a revived Penn-in-Seoul program for 20 Penn students beginning this July. Students will take classes at SNU and participate in internships at multinational corporations and government agencies in Korea.

Gutmann also announced two gifts to Penn's Korean Studies Program at a gathering of more than 500 alumni in Seoul. Alumnus James Joo-Jin Kim gave US$56 million to the Korean Studies Program, to be renamed the James Joo-Jin Kim Program in Korean Studies, and an anonymous alumnus gave US$1.5 million to establish a post-doctoral fellowship in Korean Studies.

"Because the Republic of Korea is such an important global presence, I am especially pleased to be able to announce this gift in Seoul," Gutmann said. "Joo-Jin Kim's generosity will enable us to expose an even wider community of students to Korea—by weaving an understanding and appreciation of the country into the fabric of academic life at Penn."

Korea represents the third-largest country of origin for international students at Penn—comprising roughly 11 per cent of all international students at the University. More than 1,600 alumni currently reside in Korea, and Penn had 545 graduate and undergraduate students from there in 2010/11.
Dear reader,

When I was finishing this edition of Dental Tribune Asia Pacific, news broke that a politician and former dental hygienist who treated the Italian Prime Minister could face trial for charges of running a prostitute ring. Unfortunately, I had to abandon the story at the very last minute owing to threats directed towards our licence partner in Italy.

There are indeed many obstacles the journalistic profession has to face nowadays, such as greater time pressure, diminishing revenues and, to some extent, social media. The greatest threat in many countries however comes from the political and economic forces that pursue power and prestige at the expenses of the masses.

I live in a country where freedom of press is relatively protected and censorship hardly exists. Many of my colleagues around the world are not that fortunate. Some even have to pay a heavy price for their trade. I wish to extend my personal respect and best wishes to those who are threatened.

In places where the present treatment of caries is tooth extraction, ART presents a promising alternative. ART does not require dental clinics with electricity, since ART uses hand tools to clear the cavities of tooth material decayed by caries. Hand tools are also used for the subsequent placing of glass ionomers. In addition, fluoride content of glass ionomers may be beneficial in caries prevention. The ART technique is also easy to learn and use even for non-dental professionals. Because of this, a five-week training period rather than five years suffices for professional restoration of decayed teeth.

In the end, everybody benefits from not inserting amalgam fillings, thereby markedly reducing human exposure, as well as mercury emissions into air and water, while improving oral health and quality of life.

Yours sincerely,
Daniel Zimmermann
Group Editor
Dental Tribune International

EU amalgam initiative is welcome

Lars Hylander
Sweden

I welcome the new initiative by the European Commission to look into the amalgam issue. Experiences from the Nordic countries in Europe and Japan clearly demonstrate that dental fillings containing mercury do not belong in developed societies...

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Contact Info
Lars Hylander is an Associate Professor at Uppsala University, Sweden, and an internationally acknowledged expert on amalgam. He can be contacted at lars.hylander@hyd.uu.se.

EU amalgam initiative is welcome

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I welcome the new initiative by the European Commission to look into the amalgam issue. Experiences from the Nordic countries in Europe and Japan clearly demonstrate that dental fillings containing mercury do not belong in developed societies for both environmental and health reasons. It is also quite clear that amalgam is not an alternative even in developing countries, where poor infrastructure and lack of trained dentists cause additional restrictions on amalgam use, in addition to environmental and health protection.

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International Team for Implantology awards André Schroeder Research Prize

From news report

BASEL, Switzerland: The International Team for Implantology (ITI) has awarded Dr Nikola Saulacic, dentist, oral surgeon and researcher at the University of Bern, Switzerland, with the 16th André Schroeder Research Prize. Mid-June, Prof. Daniel Buser, president of the academic organization dedicated to the promotion of evidence-based education and research in the field of implant dentistry, presented the prize at the ITI Congress Benelux in Amsterdam in the Netherlands.

Forty-two-year-old Saulacic was selected by the ITI Research Committee through an anonymous evaluation process. The committee honoured the researcher for his experimental study on “Bone apposition to a titanium-zirconium alloy implant surface” which is aimed at determining the early healing events of titanium-zirconium (TiZr) implants in comparison with titanium implants, both with a modified sandblasted and acid etched (SLActive) surface, and an implant material with additional strength (Ti6Al4V). The study concluded that TiZr implants showed comparably fast early osseointegration than titanium implants supporting their use for more challenging clinical situations in which implants with a reduced diameter are indicated.

The André Schroeder Research Prize was established almost 20 years ago and is presented annually in honour of the late Prof. André Schroeder (1918–2004), founding ITI President, who pioneered implant dentistry and whose life work contributed significantly to modern dentistry. It is worth CHF 20,000 (US$24,000) in cash. According to the ITI, it is one of the most prestigious awards in implant dentistry.

US scientists measure dino blood

Daniel Zimmermann

NEW YORK, USA: New findings using dinosaur teeth could help to explain how the reptiles were able to regulate their body temperature, researchers from the California Institute of Technology in the US have reported. By measuring subatomic particle concentrations in fossil teeth in two of the largest dinosaur species, they claim to have found that the animals’ body temperatures were much higher than that of other reptiles and comparable to mammals.

Since the first species was officially classified, anthropologists have quibbled over whether dinosaurs were cold- or warm-blooded. The latest research suggests that they were warmer than originally expected and probably able to reduce body heat through special physiological features. Scientists, however, were not able to determine the body temperature of the creatures except through indirect methods, such as measuring the spacing of dinosaur tracks.

The new approach developed by geochemist Robert Eagle and geologist Prof. John Eiler is able to determine body temperature to within one or two degrees, the researchers say. It measures the concentration of rare carbon and oxygen particles that clump and form minerals called bioapatites, a process that is dependent on heat. The researchers analysed the clumps in 11 teeth of the Brachiosaurus brancai and Camarasaurus species found in different locations in the US and Tanzania.

"Nobody has used this approach to look at dinosaur body temperatures before so our study provides a completely different angle on the long-standing debate about dinosaur physiology," Eagle commented. He and Prof. Eiler announced that they would be applying the method to other dinosaurs and extinct animals, such as measuring the spacing of dinosaur tracks.

Dr Nikola Saulacic (left) and Prof. Daniel Buser (Photo courtesy of ITI, Switzerland)
New portable chair could aid dental treatment

Daniel Zimmermann

NEW YORK, USA: Design and Engineering students from Purdue University in West Lafayette in the US have developed a new kind of portable medical chair that can also be used for dental treatment. The device, named the Mantis owing to its ability to transform into various shapes, does not have any gears or motors and can be folded into a dolly to suit different medical uses. It is intended to help carry out treatment in underdeveloped countries, where operating traditional surgical equipment can be difficult.

The idea came from Industrial Design student Leha Kenttämaa-Squires following several visits to a dental office. In order to realise her concept, she teamed up with Mechanical Engineering graduate Kyle Amick, who helped to build the first prototype. According to Kenttämaa-Squires, the Mantis is extremely lightweight for carrying by commercial airliners and can store additional medical and dental equipment.

The students are currently seeking to license and commercialise the chair through the Purdue Research Foundations Office of Technology Commercialization, an office that protects and promotes the university’s intellectual property. Kenttämaa-Squires said that once patented the chair could be available to dental professionals worldwide within two years.

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FDI calls for oral disease to be integrated in UN NCD list

FDI has called for oral disease to be integrated into the list of non-communicable diseases (NCDs) for priority action within the United Nations and WHO.

Jean-Luc Eiselé, FDI Executive Director told a Civil Society Hearing on NCDs held at the UN headquarters in New York on 16 June that the current list—which comprises only cancer, diabetes and respiratory and cardiovascular diseases—should be extended.

All oral conditions share common risk factors with the other four major NCDs, including unhealthy diet (particularly high sugar consumption), tobacco, and harmful alcohol use. Oral health professionals should be an integral part of the solution for prevention, early diagnosis and treatment.

Dr Eiselé made the call during a submission on behalf of the World Health Professions Alliance (WHPA) campaign on NCDs, launched in May in advance of the 64th World Health Assembly, warning of the global epidemic of NCDs.

His remarks were echoed later in the day at the panel ‘Non-communicable diseases: an integrated and effective’ approach to non-communicable diseases’.

In the submission, Dr Eiselé stressed the key role that health professionals play in reducing the global NCD burden through health promotion, disease prevention, patient care and rehabilitation, adding “The WHPA views access to health care as a human right, whether diseases are communicable or non-communicable, acute or chronic.”

WHPA brings together FDI, the International Council of Nurses (ICN), the International Pharmaceutical Federation (FIP), the World Confederation for Physical Therapy (WCPT) and the World Medical Association (WMA). Recent Alliance campaigns include a push against counterfeiting of medical products, launched in 2010, which it calls “a serious threat to patient safety and public health worldwide.”

MDA/FDI: President Dr Roberto Vianna salutes expertise of oral health professionals at Malaysia Conference

In a two June addresses, FDI President Dr Roberto Vianna saluted oral health professionals for their expertise, “A key component”, he said, “in community-based health care and prevention strategies.”

“Their role needs to be strengthened and emphasised if meaningful progress is to be achieved in reducing oral disease burdens,” stressed Dr Vianna.

Addressing the assembled dignitaries and guests at the gala dinner, 11 June, of the 68th edition of the Malaysian Dental Association Annual General Meeting and Trade Exhibition in Kuala Lumpur, Dr. Vianna complimented the event’s organizers on the breadth of subject areas covered in the scientific programme, delivered by national and international experts.

The FDI President also congratulated the winners of the MDA oral and poster competitions, “I am sure the prize will serve as an encouragement and reinforce your commitment to the art of dentistry and patient care,” he said.

In his address, Dr Vianna described FDI efforts to encourage governments to prioritize and promote oral health and consider it a citizens’ right. Recognising the lack of public health resources, he nevertheless stressed that “it is important to bring oral health to the attention of decision makers during a United Nations Civil Society Hearing on 16 June, held in advance of the United Nations Summit on Non-communicable Diseases (NCDs) in September.

“Most oral diseases are entirely preventable; integrating them in the framework of common NCD risk factors is possible and a natural choice,” said Dr Vianna.

“Oral conditions need to be recognised and their care needs to be covered by emerging social health insurance models, a key challenge for low- and middle-income countries. The same applies to the full and effective integration of oral care into the primary health care systems of many countries,” he stressed.

“Effective models exist and need to be promoted through international collaboration and technical assistance,” concluded FDI President Roberto Vianna.

Malaysia is currently making a bid to host the 2015 Annual World Dental Congress: the FDI President’s attendance at the MDA/FDI event also allowed him to view, in the company of local officials, the impressive facilities available at the Kuala Lumpur Convention Centre.

FDI intervention at the World Health Assembly 2011

Thank you for the opportunity to speak on behalf of the World Dental Federation, which represents the collective views of more than a million dentists, through national dental associations in more than 154 countries.

Diseases of the mouth, tooth decay, periodontal or gum diseases, and cancer of the mouth, are some of the most common chronic, non-communicable diseases, affecting more than 90% of the world’s population.

These oral diseases are significant burden on overall health and risk factors are shared with other non-communicable diseases. The World Health Organization recognised this fact with the landmark World Health Assembly Resolution in 2007.

The burden of diseases of the mouth are rising due to rapidly changing lifestyle, particularly in low- and middle-income countries, which can least afford to deal with the consequences, in terms of poor health outcomes and negative impact on national health budgets.

An integrated ‘collaborative’ approach to non-communicable disease prevention, one which includes oral disease prevention and health promotion, will have significant benefits in terms of strengthening health systems and oral health care delivery. Primary Health Care Coverage and improving access to care will help the control of pain and suffering thereby resulting in measurable improvements in general health and quality of life.

FDI works closely with the WHO Global Oral Health Programme, in efforts to strengthen integrated approaches to disease prevention based on common risk factors and health promotion. FDI encourages WHO to recognize oral diseases as major global noncommunicable diseases and calls for their inclusion in the Outcomes Document of the UN High Level Summit on Noncommunicable Diseases in New York this September.
The highly successful Live.Learn.Laugh. (LLL) Partnership 2011 Global Workshop, held 3–4 May in Manila, Philippines, focused debate on how a process of continuous evaluation can strengthen the implementation of LLL Phase II projects.

Live.Learn.Laugh. (LLL) refers to the unique global partnership between FDI World Dental Federation and Unilever Oral Care which began in 2004. Following an evaluation of Phase I in 2009, Phase II was launched on 2 September 2010 at the FDI AWDC in Salvador da Bahia, Brazil. This partnership now has a new, more focused goal - "to work together to measurably improve oral health through twice daily brushing with a fluoride toothpaste".

The Manila workshop, attended by 26 representatives from 22 National Dental Associations and members of global partnership team from FDI and Unilever Oral Care, coincided with the 33rd Asia Pacific Dental Congress.

The Global Workshop provided an opportunity to share, together with experts from the FDI World Dental Development and Health Promotion Committee (WDDHPC), best practices and examples of experiential learning through a variety of presentations and group discussions.

Participants were also able to gain useful insights into the power of communications tools—such as the press launch of the Philippines LLL Phase II project—to leverage the impact of work by the Live.Learn.Laugh. Partnership on public health.

In the light of the successful Global Workshop, FDI is looking forward to working with its National Dental Association members and Unilever Oral Care to ensure positive outcomes for all Phase II projects in the coming years.
DENTSPLO International Inc. has signed a definitive agreement to acquire AstraZeneca’s subsidiary Astra Tech, headquartered in Molndal in Sweden. At the end of June, the company announced the transaction, which is anticipated to be completed during the second half of 2011.

AstraZeneca headquarters in London. The company recently sold its dental implant business to DENTSPLY (DTE/Photo courtesy of Ivoclar Vivadent plv, UK).

Astra Tech, which recorded worldwide revenue of US$555 million in 2010, has two main business divisions: a dental division, which is engaged in the research, development, manufacturing and marketing of dental implants, and a health-care division, a business focused on medical devices for use primarily in urology and surgery. The first Rumours of a possible sale of the subsidiary arose last November, when London based AstraZeneca announced it would review strategic options for its Astra Tech unit, which is now being sold for approximately US$1.8 billion.

According to DENTSPLY, headquartered in York in the US, the transaction combines two of the fastest growing dental implant business, creating a strong global competitor with a number and is committed to continuing to play a key role in the region’s future development. The company currently runs six subsidiaries, a manufacturing site, and a marketing and sales office, and employs a quarter of its more than 2,400 employees worldwide there. A strong regional presence is also facilitated by collaborating with leading dental publishers in Asia. With Ivoclar Vivadent invited to Schaan, the location of the company's headquarters, for the second time since 2006. The goal was to inform the guests about Ivoclar Vivadent’s developments and future goals, as well as connect professionals with each other to create a strong information network. “Events like these not only give us an insight into how the company functions from day to day, but also create a common platform for publishers like myself to exchange ideas and share knowledge,” Badal Gullhati, Group Publisher of Medi-Media India, commented. The unique social programme, which included cooking homemade pasta in a 650-year-old farm house, certainly contributed to this exchange.

With a 14% growth rate in Asia-Pacific, 2010 was a successful year for the Ivoclar Vivadent group. According to the company, worldwide sales totalled CHF695 million (US$767 million) in the past year, an increase of 9.5% since 2009, a growth that can be attributed to an increase in the company’s major product categories and brands. In particular, growth rates above the market average were achieved in all-ceramics, cements, adhesives, denture teeth and equipment sectors. Moreover, use of the worldwide leading all-ceramic brand IPS e.max increased by a remarkable 48% from the previous year amongst dental technicians and dentists in the region.

Ivoclar Vivadent has adapted its product portfolio to take account of the needs of the Asia-Pacific markets specifically. Accordingly, the company’s range includes the Tetric N-Ceram and Tri-Ecomonom composites alongside the Variolink N, Multilink N and Multilink Speed cements. By expanding its sales force, the company has been able to further build on its strong position and consolidate its regional market presence.

“The rapid development of the Asia-Pacific region will continue in the future,” Christian Brutzer, Sales Director for Asia-Pacific, said. “For 2011 alone, we expect an increase in sales of 9 to 10%.” To keep pace with the increasing demand, Ivoclar Vivadent has strengthened its presence in the region. The existing marketing and sales offices in India, Singapore and Korea have recently been reorganised into subsidiaries, and a branch in Japan and a subsidiary in China are to be established. Furthermore, a regional product portfolio will further strengthen and expand Ivoclar Vivadent’s market presence.
Moving the dental world from analogue to digital: 3Shape’s success story continues

Bernhard Mollenhauer & Matthias Disseler

During SCANDEA, a major dental fair in Scandinavia, DTI recently visited the 3Shape headquarters in the heart of downtown Copenhagen to learn about the company’s new products and future strategies. The trip started with a visit to the building that houses the 3Shape headquarters on Kongens Nytorv square and the Royal Danish Theatre has light and airy rooms, a perfect environment for a young, passionate and ambitious organisation driven to develop the best technological solutions in 3-D scanning and CAD/CAM.

Often referred to as the “Google of the Dental Industry”, 3Shape was founded eleven years ago in a one-room apartment by two young and ambitious students from the Technical University of Denmark and Copenhagen Business School—Tais Clausen and Nikolaj Deichmann. At the time, Clausen was completing his master’s thesis on a groundbreaking 3-D scanning technology and Deichmann was finalising his master’s degree in Finance and Economics. Having met through friends, they joined forces to participate in the prestigious Venture Cup business plan competition, established by McKinsey and Co., in which they finished second. Throughout the competition, they constantly considered the manner in which the technology could be commercialised and thus the idea of launching 3Shape was born.

Initially, Clausen and Deichmann approached companies in the dental industry and advocated the idea of developing a quality-control system for hearing-aid shells and ear moulds. Similar to a dental restoration, the devices need to be custom-fitted to the patient’s hearing canal and are traditionally made by taking an ear impression that is then manually sculpted, cut and used to make a mould—a time-consuming, manual procedure.

“During these first meetings, we realised that we could actually create a mass-customisation production system,” Deichmann remembered. “So instead of just checking the quality we decided to go directly for changing the workflow completely, from a manual process, where you spend two hours shaping the hearing-aid shells, to a completely digital workflow.”

3Shape digitised the entire manufacturing process by introducing a 3-D scanner for ear impression taking, as well as the management software and CAD software needed to simulate the position of all the electronic components that need to fit into the patient’s ear along with the shell, taking up minimal space and using CAM software for controlling the manufacturing equipment. They developed the system for a specific hearing-aid manufacturer but retained the rights to sell the technology to others.

At the time, there were only six companies that controlled approximately 90 % of the global hearing-aid market and within a period of three years, all of them went from a completely manual to an entirely digital production. Today, about 90 % of all hearing-aid devices are produced using 3Shape’s technology.

Clausen and Deichmann were always aware of the 3-D scanning industry’s enormous potential so they soon looked to other industries where the manufacturing processes are similar to the hearing-aid industry, such as dental laboratories. In 2004, 3Shape began to receive an increasing number of requests from dental companies interested in the technology.

“We quickly decided that if we wanted to replicate our success in the hearing-aid industry, we needed to go for the full solution to have a very user-friendly system that the dental laboratories would adopt. Therefore, we went to a lot of laboratories, small ones and big ones, and tried to figure out how we could optimise the processes instead of just finding a better way to make hearing-aid copings. From the very beginning, our vision was to achieve a complete switch from analogue to digital,” Deichmann explained.

3Shape introduced its first 3-D dental scanner and CAD/CAM software for virtual restoration design at the International Dental Show (IDS) in Cologne in 2005 and the system became a raving success. In the following years, the company extended and enhanced their dental laboratory product range by continuously responding to and involving their customers from the early stages of the product development process.

“Perhaps the most important lesson we have learned is that intra-oral scanning solution, which aims to revolutionise the dental practice. The 3Shape booth was literally flooded with dentists trying to get a glimpse of the sleek and elegantly designed scanner.

One of the TRIOS 5-D scanner’s notable features is that it does not require dentists to apply spray or powder to coat the patient’s teeth, making scanning an easy, fast and comfortable process that does not run scan accuracy by adding material to teeth surfaces. In addition, it can scan any material, such as metal, semi-transparent materials and resin. It only requires minimal training for use in clinical practice. The scanner captures over 3,000 2-D images per second, which is 100 times faster than a conventional video camera. Dentists who viewed the presentations at IDS stated that “an impression-free” dental practice seems to be just around the corner.

An open communication interface allows dentists to send the scanned data via the Internet directly to the laboratory of their choice, where the technicians start designing the restoration immediately using 3Shape Dental System software or the appropriate interface to third-party software. The TRIOS communication software includes a tool to visualise the technician’s solutions for the patient, for example an iPad, which the technician is still in the chair, which is especially important for anterior cases.

The system is designed to give high-quality restorations and treat more patients than rather than spending time and money on chairside milling. It handles a wide range of indications and produces quality 3-D data that can easily be realised by any laboratory.

Generally, digital data is controllable, predictable and available at any time in the dental office, not just at the beginning of each appointment. This guarantees that the dentist owns and is able to control the entire innovation and can potentially export virtual set-ups to other systems, as well as for appliance manufacturing.

Surprisingly, 3Shape is the only major dental company that offers easily integrable solutions. All products are designed as plug-and-play solutions and feature open interfaces for connection to third-party applications.

3Shape has won Ernst & Young’s Entrepreneur of the Year in the Innovation category in Denmark three times. This prestigious award recognises innovation, leadership, state-of-the-art products and future strategies. 3Shape product managers and key developers have regular meetings with distribution partners around the world to keep each product at the top of its class. During the life cycle, the products are developed in close collaboration with partners who understand and continue to gather the needs of the customer base and the market.

But even with ten years of outstanding success, 3Shape never stops looking ahead. The company believes that the age of digitally designed, 3D-printed dental restorations is about five years down the road (of course there will always be smaller, traditional dental practices).
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“Māori are at a greater risk of having diminished access to dental care”

An interview with Bridget Robson, New Zealand

A recent national report on oral health in New Zealand has found that Māori adults are nearly twice as likely as non-Māori adults to be edentulous. They are also significantly more likely to have periodontal disease, as well as untreated coronal and root decay.

Dental Tribune Asia Pacific spoke with Dr Bridget Robson, Director of the Eru Poāmare Māori Health Research Centre at the Wellington School of Medicine and Health Science, University of Otago, about the causes and how better access to dental services could be achieved for the country’s large indigenous population.

Daniel Zimmermann: Ms Robson, has oral health of the Māori always been in such a poor state?

Bridget Robson: Historic records indicate very low rates of caries prior to European contact. The introduction of a European diet, particularly sugar products, started affecting Māori oral health in the 19th century. As traditional food resources became increasingly inaccessible over the 20th century, owing to loss of land and environmental degradation, Māori diets continued to become more “Westernised”, and subsequently caries became more prevalent.

The colonial processes that forced shifts of power, land and other resources into non-Māori hands led to major societal change for Māori, who went from being “landowners” and successful business collectives to largely having to work for others. This has resulted in Māori being over-represented in socio-economically disadvantaged areas, with lower access to toothbrushes and fluoridated toothpaste, as well as greater cost barriers to regular dental care.

What impact does poor oral health have on Māori communities today?

The communities that were part of our research talked about the embarrassment and stigma of having missing or damaged teeth, bad breath and ill-fitting or damaged dentures. They described problems with communication, mood and being able to chew food. The majority reported experiencing pain, sometimes bad enough that they resort to self-medications, such as “poking with a needle to try and kill the nerve”, pulling their own teeth with pliers, and using whiskey as pain relief. Some discussed the impact on family finances, having to go without other necessities in order to pay for urgent dental care. Sadly, one community had been through the trauma of losing a family member owing to an untreated oral infection.

Which groups within the indigenous population are particularly affected?

The groups we have focused on are non-Māori groups that include families with low incomes, older Māori, and those with disabilities or special needs, or health conditions such as diabetes that increase the risk of periodontal disease. The determination of good oral health are less available to low-income families, including fluoridated toothpaste and healthy food. Smoking is more common among socio-economically disadvantaged and chronic diseases are more prevalent, including those that are associated with gum disease, such as diabetes. There is also a clear gradient in health literacy by income amongst both Māori and non-Māori. Although the need for dental care is higher, it is less affordable or accessible for families with restricted incomes.

The minimum monthly wage in New Zealand is currently NZ$520 (US$410). How many Māori are currently living in low-income conditions?

More than one in four Māori live in economic hardship compared with one in eight of the total New Zealand population. One in four is in the lowest income quintile, and one in four lives in the 10 percent of neighbourhoods that are the most socio-economically deprived. Owing to the disparities in wealth and assets, Māori incomes are more closely tied to employment status than non-Māori and therefore vulnerable to economic shocks, such as the current recession, affecting unemployment.

The unemployment rate of around 14 percent amongst Māori is currently over twice the rate for non-Māori, and much higher for younger Māori. This age group, ranging from 15 to 24, is particularly at risk of not receiving dental care after the age of 18, with increased caries prevalence by the age of 24.

Research has confirmed that only 1 per cent of annual oral health-care spending in New Zealand comes from low-income households. Does the problem extend beyond racial lines?

Unlike other primary health-care services in New Zealand, only a very small proportion of the NZ$21 billion spent on dental care each year is publicly funded (NZ$178 million), of which only 5 per cent is allocated to low-income adults. The lack of systematic provision of care has a differential impact on the Māori population, as the high out-of-pocket expense puts dental care increasingly out of reach.

However, the lack of culturally concordant health care and institutionalised discrimination create extra barriers for low-income Māori compared with low-income non-Māori. Within the disabled population living in households, disabled Māori report higher levels of dissatisfaction with health care and transport costs than disabled non-Māori. They are also less likely to have seen a dental professional in the past year than their non-Māori counterparts.

A dental system that gets it right for low-income or disabled Māori is also likely to get it right for low-income or disabled non-Māori, but the converse is not guaranteed to achieve equitable outcomes for all.

In 2006, your Ministry of Health published a paper “Strategic vision for oral health in New Zealand” in which they committed to increased investment in community oral health care services. What has changed since then?

There has been some investment in a limited number of Māori primary health care services (not for profit) in recent years to support them in extending or developing their capacity to deliver oral health care to their communities, including prevention, treatment and workforce development. The Ministry of Health and health-care providers have also established a quality improvement group for mutual support and started to extended opportunities for placement of senior dental students and dental therapy students in dental care programmes.

Moreover, the scope of practice of dental therapists has been expanded to include oral health care for adults for those who undertake the necessary training. This could allow therapists to work with the whole family a preferred way of working for many Māori health practitioners.
A new study from Alaska recently found that dental therapists can provide sufficient basic dental care to widely scattered populations. What are the experiences in New Zealand?

New Zealand, which has had dental therapists providing free dental care to schoolchildren since the 1970s, has been very supportive of the Alaska dental therapy programme, as the initial group of therapists was trained here in New Zealand. Several Māori health service providers employ dental therapists to provide dental care for children and young people up to the age of 17, working in mobile units and fixed sites. However, not all Māori aged 2 to 17 have access to a Māori dental provider, and Māori children are still less likely than non-Māori children to have seen a dental professional in the last year.

Nevertheless, perhaps the greater unmet need for dental care is in the low-income adult population, where dental care is largely unsubsidised and generally delivered through private practices. The few Māori health services that are providing low-cost dental care to adults with low incomes (predominantly but not exclusively Māori) are mostly attracting patients with significant problems owing to a previous lack of access to dental care. Dentists and dental therapists are employed in these services.

However, the coverage of these providers is limited. Significant expansion would be required to ensure all Māori receive appropriate dental care. This may also require new ways of funding, contracting and regulating oral health care and innovative workforce development to overcome dental workforce shortages, including the accelerated growth of Māori dental clinicians.

Australia offers dental schemes especially targeted at their indigenous population, the Aborigines. Do such schemes exist for New Zealand?

There are no widespread dental schemes specifically for Māori. However, some Māori health service providers are contracted to provide oral health promotion and free dental treatment to children, adolescents and, in some cases, low-cost treatment for adults with low incomes. Although these services are available to non-Māori too, they were designed to be culturally safe and effective for Māori members of the communities.

In your opinion, what can the government do to help improve oral health of the Māori population?

The government is obligated to progressively fulfil the right to health for all. Preventive, restorative and rehabilitative dental care is accessible to the affluent but often beyond reach of those who are less well off. The way New Zealand society structures opportunities and wealth means that Māori are at a greater risk of having diminished access to dental care. Poor oral health in turn can affect socio-economic prospects and general health too.

The government has a vision of “good oral health for all, for life”, but to achieve this for Māori, it needs to rethink the way in which dental care is funded and provided and address the environmental and social determinants of oral health.

What recommendations would you make based on the results of your study?

Māori communities should be allowed to better control decisions affecting the environmental determinants of health and the provision of oral health care in their communities. To meet the growing need and to reduce disparities in access, effective ways to develop the Māori oral health workforce are required with increased utilisation of other non-dental primary care and public health practitioners for oral health care and promotion.

We should also develop innovative models for oral health service delivery and systematically incorporate oral health into models for care for chronic conditions in ways that are appropriate and effective for Māori. This may require legislative, regulatory, financing, policy, training and workforce changes to ensure equity of access across the dental spectrum for Māori of all ages, incomes and disability status.

The oral health status, service utilisation and health system performance for Māori with different types of disability should be systematically monitored and appropriate models for evaluating and comparing new and existing models of oral health care should be developed that reflect Māori values and aspirations, and that are widely accepted by all key stakeholders. Such a model could facilitate evaluation of innovations and support more rapid uptake, where effective.

Fortunately, Māori health providers have already begun developing innovative services to meet the needs of their communities, embedded in primary care organisations. Continued support, evaluation, expansion and extension of such services to other areas will help to increase access to oral health care for Māori.

Thank you very much for this interview.
The role of biology in the orthodontic practice

Young Guk Park & Ze’ev Davidovitch

Orthodontic tooth movement results from forces applied to teeth that evoke cellular responses in the teeth and their surrounding tissues, including the periodontal ligament (PDL), alveolar bone and gingiva. It is advantageous for the orthodontist to know the details of the biological events that unfold during tooth movement because some of these details may differ from one person to another, owing to variables such as gender, age, psychological status, nutritional status, and drug consumption.

The purpose of this article is to emphasise that orthodontics is a field of endeavour in which mechanics and biology are integrated, and to stress the reality that tooth movement is conducted in individual human beings, each with a unique and intricate physiological system. Biological variations are the foundation of the differences that are frequently observed in the outcomes of orthodontic treatment between patients with similar malocclusions treated identically.

Principles of orthodontic biomechanics are usually taught with the help of a typodont, consisting of artificial teeth embedded in wax. This set-up ignores entirely the biological aspect of tooth movement. In the clinical setting, living patients are encountered, and mechanical forces mobilise their teeth. These movements result from the development of strains in dental and para-dental tissues, followed by modelling and remodelling of these tissues.

In some patients, systemic conditions may exist, causing complications such as root resorption, dehiscences and fenestrations of the alveolar bone. Hence, clinical orthodontics must be viewed as a specialty staunchly entrenched in biology, all the way to the molecular level. As a clinical profession, it must be based on a commanding knowledge of mechanics, biology, physiology, and pathology. The goal of this article is to enhance the biological awareness of the orthodontic practitioner in order to minimise or avoid tissue damage during orthodontic treatment. It will demonstrate that this objective may be achieved by closely focusing on the nature of root movements, and avoiding the dogmatic following of “prescription” methods that promise “automatic” correction of all malocclusions.

Tissue remodelling and orthodontic tooth movement

The actual rate of tooth movement may depend on the rate of bone turnover. The latter was modified pharmacologically in rats undergoing maxillary molar mesial movement, by inducing either hypocalcaemic or hyperparathyroidism (Verna et al., 2000). In rats with high bone turnover, the rate of tooth movement was increased, which was reduced in animals with a low turnover. Although all teeth had been moved in the same way controlled (for tipping), the location of the centre of rotation differed, depending on the position of the bone. Examination of histological sections from the jaws of these rats (Verna et al., 2005) showed that root resorption had occurred in both groups, as well as in the control group, but that it was more pronounced in the low bone turnover group. However, bone metabolism normally demonstrates measurable fluctuations that may affect the rate of tooth movement. Rats that were exposed to light for 24 or 12 hours per day for 21 days, and were subjected to orthodontic force only during the light period, presented doubling of the rate of tooth movement and bone remodelling, as compared with animals that received the force during the 12 hours of daily darkness (Miyoshi et al., 2001).

The realisation that tissue remodelling in orthodontics is mediated by a variety of cells, including fibroblasts, root and bone surface lining cells; endothelial, epithelial, and nerve cells, as well as different leukocytes, prompted clinical investigators to apply pharmacological and physical agents, concomitant with orthodontic forces in order to affect the rate of the mechanical forces. In this vein, Tweedle (1965) used local application of heat to para-dental tissues surrounding orthodontically treated teeth in dogs, Davidovitch et al. (1980) used minute electric currents, and Blechman (1988) advocated the use of static magnetic fields. Davidovitch et al. placed the electrodes much closer to the cat’s canine, resulting in a significant enhancement of movement. Blechman hypothesised that magnets generate mechanical forces, as well as magnetic fields, and that this combination acts synergistically, causing the teeth to move faster. However, an experiment in rats (Teniku et al., 2000) revealed that magnets do not speed up the mesial movement of maxillary molars, and actually increase root resorption in the early phases of treatment.

Utilisation of chemical agents in attempts to increase the pace of tissue remodelling and tooth movement has been tested in various laboratories and clinics. Yasumaki et al. (1984) injected prostaglandin (PG) E1 into the gingiva of moving teeth in human subjects, resulting in rapid movement. Yamauchi et al. (1984) injected prostaglandin (PG) E1 into the gingiva of moving teeth in human subjects, resulting in rapid movement. Systemic application of misoprostol, a PG analogue, to rats undergoing tooth movement for two weeks increased the rate of movement significantly, but not in a way that enhanced root resorption (Sekhavat et al., 2002). The results were reported following intraperitoneal injections of PGE2 in rats (Seifi et al., 2003). Chroma and Rubin (1984) used local applications of vitamin D, while Enstrom, Granstrom and Thilander (1988) used hypocalcaemia, vitamin-D deficiency, lactating rats. The bone matrix component osteocalcin was injected into rats in the palatal bifurcation of a tipping molar, causing rapid tooth movement owing to the attraction of numerous osteoclasts to this site (Hashimoto et al., 2001).

The reports cited above suggest that the effect of tissue remodelling and the rate of tooth movement can be significantly influenced by numerous factors other than the orthodontic forces on para-dental cells. However, if our goal is to complete orthodontic treatment successfully and in the shortest possible amount of time, then we should avoid moving roots into areas from which they will have to be retrieved later.

When mechanical loads are applied to intact tissues in vivo or in vitro, the tissues usually become distorted (strained). In the case of the skeleton, loads like gravity prompt cells to arrange the architecture of the bony structural features in a way that will resist redundant loads. This phenomenon is known as Wolff’s Law, defined by Julius Wolff in 1892. However, when bone cells are subjected to non-redundant loads, such as orthodontic forces, the cells are activated, and remodelling of the alveolar process ensues, which facilitates tooth movement. In vivo applications of compressive loads to ulnae in turkeys and roosters by Lanyon and Rubin (1984) revealed that extensive osteogenesis can be evoked by short-term dynamic (intermittent) forces. In those experiments, the optimal load magnitude was 2,000 to 4,000 microstrain, and its daily duration was ten to 20 minutes. These findings suggest that orthodontic forces will be most effective when applied for brief periods, rather than continuously. This assumption was found to be correct in an experiment in rats by Gibson, King, and Keeling (1992). In that experiment, maxillary molars were subjected to mesially moving forces for one hour, one day, or 14 days. Teeth of rats subjected to one hour of force application continued to move mesially for 14 days, and achieved 75% of movement reached by the teeth that had been subjected to orthodontic forces continuously for 14 days.

The age factor

The effect of age on the tissue response to orthodontic force has occupied the minds of orthodont-
tists since Hunter, in the 18th century, and probably earlier. Hunter observed that orthodontic treatment is more effective in adults than in children. Studying histological sections of human teeth and their surrounding tissues, Hunter concluded that the PDL is less cellular in adults than in children. Therefore, he recommended, when treating adults, to subject their teeth to light forces initially, in order to stimulate cellular proliferation, then to increase the force magnitude, in order to stimulate these cells to remodel the para-dental tissues. This observation implies that, in essence, the nature of the biological response to orthodontic forces is similar in young and adult subjects. This hypothesis was confirmed by Shamp et al. (2005). These investigators moved molars bilingually in young (15-week-old) and old (60-week-old) rats, then studied their compensatory alveolar bone apposition under the lingual periosteum. They reported that in both age groups there had been vigorous compensatory alveolar bone growth. Thus, alveolar bone is successfully maintained, even in aged rats. Age can also refer to the duration of healing of a post-operative regenerate following distraction osteogenesis (Nakamoto et al., 2002). In an experiment on 15-month-old beagles, mandibular premolars were moved into a two-week or a 12-week regeneration period. The former consisted of immature, fibrous, and poorly mineralised bone, while the latter was composed of mature, well-organised and mineralised bone. Tooth movement was significantly faster in the "young", immature regenerate, but this movement was accompanied by extensive root resorption that extended from the cemento-enamel junction to the root apex.

The effects of pre-existing medical conditions and the development of complications

It is estimated that 10 to 15% of all children under the age of 16 are affected by chronic, long-term medical problems. These problems may affect the outcome of orthodontic treatment (Burden et al., 2001). Common medical problems in this age group include infective endocarditis, bleeding disorders, leukaemia, diabetes, cystic fibrosis, juvenile rheumatoid arthritis and renal failure. An even higher percentage of adult patients may be affected by a variety of medical problems that involve one or more of the tissue systems. These conditions, and the medications used to treat them may have profound effects on the response of dental and para-dental cells to mechanical loading.

Endocarditis is a life-threatening condition requiring primary prevention in the form of administration of antimicrobial agents prior to certain orthodontic procedures. The orthodontist must weigh the risk of endocarditis against the risk of an adverse reaction to the prescribed antibiotic therapy. Fortunately, most orthodontic procedures do not cause bacteraemia. Lucas et al. (2002) obtained blood samples from children 50 seconds after taking dental impressions, separator placement, band placement and insertion of an adjusted arch wire. Significant bacteraemia was found only after separator placement.

Orthodontic braces, fixed and removable, can accumulate bacterial plaque that may be harmful to oral soft and hard tissues. This problem has been addressed by adding antimicrobial agents to bracket bonding materials, elastic bands and crown coating varnishes. The addition of benzalkonium chloride to a composite resin added antimicrobial properties to the compound without altering its mechanical properties (Othman et al., 2002). Likewise, coating teeth in orthodontic patients with a sustained-release chlorhexidine varnish decreases Streptococcus mutans levels in the patients' saliva (Beyth et al., 2005).

Children treated for childhood cancers with both radiation and chemotherapy often exhibit disturbances in dental development, such as tooth agenesis, teeth with short roots or with no roots altogether. A retrospective analysis of treatment outcome in ten orthodontic patients with such a background revealed that five had been treated with lighter forces than usual, one displayed root resorption, and four achieved unsatisfactory results (Dahlin et al., 2001).

The development of inflammation in dental and para-dental tissues during the course of orthodontic treatment implies that circulating plasma and leukocytes migrate out of capillaries, and interact with native cells. The blood plasma may contain endogenous hormones produced by endocrine glands, as well as a variety of molecules derived from consumed drugs and nutrients. Some of these molecules may interact with para-dental target cells, augmenting or inhibiting the effects of mechanical forces on these cells.
One of the main complications of such interactions is the development of root resorption.

Diabetes mellitus affects 3 to 4% of the population, and is characterised by hyperglycaemia caused by the body's deficient management of insulin. There are two main types of diabetes: type 1 and type 2. In type 1, there is a total deficiency in insulin secretion, while in type 2 there is a combination of resistance to insulin action and insufficient compensatory insulin secretion. Diagnosis and monitoring of diabetes is based on blood glucose concentration or glycosylated haemoglobin concentration. Oral manifestations of the disease include xerostomia, chronic gingivitis and periodontitis, excessive loss of alveolar bone and PDL, poor healing of wounds, and soft tissue lesions, both candidal and non-candidal wounds, and soft tissue lesions, their increased production levels of cytokines may increase the risk of root resorption. An indicator of such an increased risk may be the concentration of cytokines in the gingival crevicular fluid. Previous studies reported on increased levels of cytokines, such as tumour necrosis factor-α and interleukin-6 in the gingival crevicular fluid of orthodontically treated teeth in humans (Kim and Park, 2000). The origin of these cytokines is most likely PDL cells.

Allergies and asthma are conditions involving periodic production of large amounts of pro-inflammatory cytokines in the airway mucosa and the skin. Primed leukocytes derived from these tissues may travel through the circulatory system to the extravascular space of the tissues surrounding orthodontically treated teeth. Consequently, patients with a history of allergies and/or asthma appear to be at high risk of developing excessive root resorption during the course of orthodontic treatment (Davidovitch et al., 1999). Hence, it is postulated that any inflammatory condition, such as gastro-enteritis, arthritis and thyroïditis, may increase the risk of orthodontic root resorption.

Allergy manifestations in orthodontics are infrequent, although the frequency of allergic diseases in the industrialised world is rising. The WHO reports that 15% of the population has had or will have an allergic disease. Allergic reactions to orthodontic materials can develop during treatment, manifesting as urticaria, angioedema, stomatitis and cheilitis (Beaudovin et al., 2003). Metals in orthodontic appliances that can induce an allergic reaction are nickel, chromium, cobalt and titanium. Other allergy-inducing materials include latex, resins, adhesives and methyl methacrylates. When a reaction that appears to be allergy-related is detected in an orthodontic patient, there should be referral to an allergist for advice. Close collaboration between the orthodontist and the allergist is essential for each future stage of the orthodontic treatment in order to avoid further complications.

A method to detect patients sensitive to orthodontic alloys was developed in the form of an in vitro cell proliferation assay (Marigo et al., 2005). The best parameters for inducing the strongest cell proliferation response were 10 μmol nickel sulphate, 10 mmol benzamidine, and 200,000 cells. With this method, it was possible to distinguish between nickel-sensitive and non-nickel-sensitive patients. Moreover, it was found that exposure to nickel alloys for periods longer than two years may lead to the development of oral tolerance mechanisms that modulate nickel sensitivity.

Consumption of low or moderate amounts of alcohol may have beneficial effects on the cardiovascular system, but chronic ingestion of large amounts of alcohol on a daily basis may have devastating effects on a number of tissue systems, including the skeletal system. Alcoholism may lead to severe complications, such as liver cirrhosis, neuropathies, osteoporosis, and spontaneous bone fractures. Circulating ethanol inhibits the hydroxylation of vitamin D3 in the liver, thus impeding calcium homeostasis. In such situations, the synthesis of parathyroid hormone is increased, tipping the balance of cellular functions towards enhanced resorption of mineralised tissues, including dental roots, in order to maintain normal levels of calcium in the blood (10 mg). Therefore, chronic alcoholics receiving orthodontic treatment are at a high risk of developing severe root resorption during the course of orthodontic treatment.

Demelinating diseases such as multiple sclerosis are associated with an abnormally high incidence of trigeminal neuralgia. In multiple sclerosis, afferent nerve fibres lose their myelin sheaths, leading to short circuits between axons. Such short circuits in the trigeminal nerve may precipitate trigeminal neuralgia. Orthodontic treatment evokes an inflammatory reaction in para-dental tissues, including painful sensations that travel in an antidromic fashion from strained para-dental sensory nerve endings. If areas of demelination are present along the way to the Gasserian ganglion, trigeminal neuralgia may ensue.

Psychological stress is a common component of everyday life. It may be found in patients prior to the onset of orthodontic treatment, or it may develop during the course of treatment owing to discomfort, resentment or other reasons unrelated to orthodontics. Psychological stress affects the hypothalamic-pituitary-adrenal (HPA) axis, and the immune system. Since osteoclasts and odontoclasts are involved in the immune system, modification of their function by psychological stress may affect the process of root resorption. A recent survey showed that orthodontic patients with psychological stress were at a high risk of developing excessive root resorption during the course of orthodontic treatment (Davidovitch et al., 1999). Furthermore, patients who are non-compliant, poor co-operators and those who frequently break appointments and/or appliances do it most likely because of psychological stress. Often, these non-compliant individuals express their objection to orthodontic care that had been imposed on them by their parents through their behaviour. In these individuals, the rate of orthodontic root resorption was found to be significantly higher than in compliant patients.

Amongst the reasons for partial and total loss of scalp hair is psychological stress, probably through effects on the HPA axis. Davidovitch et al. (1999) reported a case of an adolescent orthodontic patient with alopecia totalis during orthodontic treatment. A review of the case revealed a normal medical background with the presence of a persistent psychological stress owing to exposure to orthodontic mechanotherapy. Consequently, the patient’s paediatrician and the endocrinologist concluded that his alopecia had been most likely caused by psychological stress evoked by the orthodontic treatment.
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Direct composite restoration in a complex patient case—A valuable alternative

Fig. 1: Initial situation after completion of periodontal treatment. — Fig. 2: View from the palatal side: the carious lesions and defective restorations are clearly discernible. — Fig. 3: Removal of various tooth structures. — Fig. 4: Beveling of preparation margins.

Fig. 5: Selective etching of tooth structure: the etching gel was allowed to react with the enamel for 30 seconds. — Fig. 6: Palatal layer of Tetric N-Ceram Bleach L. At this point, a fibre-reinforced post had already been inserted into the root canal of tooth #11. — Fig. 7: The dentine core was reconstructed with Tetric N-Ceram A3.5 Dentin. — Fig. 8: The proximal areas were built up after a thin metal matrix had been applied and secured in the interproximal area.

Fig. 9: Application of Tetric Color white. — Fig. 10: Finishing with Astropol. — Fig. 11: High-gloss polishing with Astrobrush. — Fig. 12: Final result.

Conventional restorative methods help preserve as much healthy tooth structure as possible and slow down the destructive restorative cycle. Nonetheless, direct restorative treatment may offer a valuable alternative, even if it may not be the first choice. Direct composite restorations are particularly useful for patients who are looking for an inexpensive treatment option. Modern direct restorative materials facilitate minimally invasive preparation techniques and provide long-lasting results.

Direct restorative treatment is particularly suited to the reconstruction of anterior teeth in cases in which there is substantial loss of tooth structure. However, appropriate treatment planning and a systematic application of the adhesive technique, particularly if anterior guidance has to be re-established, are prerequisite for achieving a successful result. This report describes the reconstruction of anterior teeth that were severely damaged by dental caries. The treatment involved the use of a fibre-reinforced root-canal post and a build-up restoration with Tetric N-Ceram (nano-optimised composite material; Ivoclar Vivadent). The restorations were customised with Tetric Color (Ivoclar Vivadent).

The patient was referred to us by his periodontologist to have his upper incisors reconstructed. The teeth in question showed substantial loss of tooth structure due to multiple medium-sized to large carious lesions and fractures of the existing restorations. Upon completion of periodontal treatment, tooth #11 was treated endodontically. Subsequently, the planning stage was commenced. For this purpose, a diagnostic wax-up was created for teeth #12, 11, 21 and 22. This wax pattern fulfilled two functions: it allowed evaluation of the function and morphology of the planned restoration and fabrication of a silicone key, which the dental team used as a guide during the composite build-up.

At the first session, the teeth were first treated prophylactically to remove extrinsic staining. After that, the carious dentine was excavated with a round carbide bur at slow speed. A completely dry treatment field was established with a rubber dam to ensure appropriate adhesive bonding. The enamel margins were bevelled to enhance the adhesion of the restoration (Fig. 4). This marginal design also created a gentle transition between the natural tooth structure and the restoration.

Next, the fibre-reinforced post was inserted and cemented into the root canal of tooth #11 to compensate for the extensive loss of tooth structure and enable the subsequent placement of the restorative material. Surplus cement was carefully removed from the root-canal entrance. Next, the enamel and dentine were etched with phosphoric acid (enamel for 30 seconds and dentine for 15 seconds; Fig. 5). Then, the adhesive was applied to the substrate, which was still moist, and polymerised until the surface showed an even, glossy appearance. This indicated that the prepared surfaces and dentine tubules had been sealed reliably.

After application of the adhesive, the palatal walls were first built up using Tetric N-Ceram Bleach L (Fig. 6). For this purpose, the silicone key, which was produced based on the wax-up, was employed. In the incisal area in particular, the layer thicknesses should be kept to a minimum to ensure sufficient space for the subsequent application of the effect materials. A curing time of 10 seconds with a blue-phase light unit (> 1,200 mW/cm²) is sufficient, owing to the thin thickness of the layers. The dentine core was built up with Tetric N-Ceram A3.5 Dentin. The mamelons were only slightly accented to match the age-specific characteristics of the patient (Fig. 7). It is important to note that layers exceeding 2 mm are not applied at any stage. Furthermore, each layer should be light-cured for 20 seconds using a light output of at least 500 mW/cm².

Short curing times of 10 seconds are sufficient with light units that provide an output of > 1,200 mW/cm². The composite may be adapted with a brush to avoid entrapment of air bubbles. A thin metal matrix was applied and secured with a wooden wedge to create optimal contact areas (Fig. 8). The aesthetic design may be optimised with characteristic materials to meet the individual requirements of the patient (Tetric Color white was used in the present case; Fig. 9). Next, a thin layer of Tetric N-Ceram Bleach L was applied to establish an ideal outline of the mamelons and ideal light reflection angles. Flexible discs and abrasive silicone polishers were used for finishing the restoration.

Final polishing of the restoration was performed during a second appointment. The Astropol silicone polishing system and Astrobrush polishing brushes (both Ivoclar Vivadent) were utilised (Figs. 10 & 11). These auxiliaries ensure both an optical surface gloss and a fine surface texture (Fig. 12).

Conclusion

As patients’ expectations of dental aesthetics are continuing to rise substantially, restoring anterior teeth constitutes a veritable challenge. Although the direct restorative technique does not necessarily present the method of choice for large reconstructions in the anterior region, as indirect restorations tend to be preferred for this indication, it may nonetheless offer a viable alternative for patients who cannot afford, or do not want to pay, the cost of more expensive treatment.

Acknowledgement

We would like to thank Dr Carla Franco V, who was responsible for the periodontal treatment and therefore contributed substantially to the successful outcome of this patient case. We also highly appreciate her continued academic support.

Contact Info

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“Practice management is a full-time job”

An interview with dentist and author Dr Michael Young, UK

DENTAL TRIBUNE Asia Pacific Edition

Off time 19

What inspired the title and was your book planned this way from the beginning?

I figured that I wanted my book to be different, and calling it “The idea of control cannot be emphasised enough.” should dentists devote to practice management without compromising good clinical practice?

Whatever you are doing at the moment and whether you are doing for a second book.

Please note that this interview was conducted before the COVID-19 pandemic.

The idea of control cannot be emphasised enough.

The idea of control cannot be emphasised enough. How much time can or should dentists devote to practice management without compromising good clinical practice?

According to your book, all aspects of a dental practice should be controlled by the dentist. How is it that you came across, either bad or good. To win, you must reduce the number of bad or wrong decisions to a minimum; you are never going to be right all the time. Recognising when you have made a wrong decision and not making the same mistake twice, that is, learning from your mistakes, is important attributes.

The Art of War by Sun Tzu is divided into thirteen chapters all about military strategy. As you read each of the chapter titles, you can’t help but think about the similarities between business planning and waging war: laying plans, the plan of attack, positioning, directing, weak and strong points, manoeuvring, variation of tactics, moving the force, situational positioning, the nine situations, fiery attack and the use of spies. I see strong parallels. However, they all have one theme, and that is planning.

If you think of running a business as being at war, then every-thing you do has a consequence, either bad or good. To win, you must reduce the number of bad or wrong decisions to a minimum; you are never going to be right all the time. Recognising when you have made a wrong decision and not making the same mistake twice, that is, learning from your mistakes, is important attributes.

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