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GIANT PANDA TEETH

Scientists from China and US have discovered what is the key to pandas' teeth lasting a lifetime. Their obsevations inspire the design of artificial durable ceramics.

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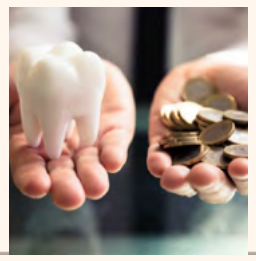

SUBSIDISE DENTAL WORK

Lower sio-economic groups in New Zealand cannot afford dental treatments. Government should be looking for more ways to better subsidise dental care for adults.

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INTERVIEW

Dr Jongho Choi, Brush Monster co-founder and CEO of Kitten Planet, talks about an interactive mobile app that teaches children healthy brushing habits.

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Scientists discover oral cancer biomarkers associated with patient survival

By DTI

DUNEDIN, New Zealand/KOLKATA, India: In a recent study, researchers have discovered epigenetic markers that are markedly different in oral cancer tissue compared with the adjacent healthy tissue in patients. This study is one of the first to identify epigenetic markers in oral cancer. Identifying these markers could help detect early signs of cancer and significantly improve patient survival rates.

The study was conducted by researchers from the University of Otago in New Zealand and the Indian Statistical Institute (ISI) in Kolkata. The research team recruited 16 oral cancer patients in India who either smoked or chewed tobacco or had mixed habits, and took samples of their tumours and adjacent tissue. After isolating the DNA in the samples, the researchers discovered regions with altered epigenetic profiles in tumour cells compared with adjacent cells.

The findings of a new study could help decrease high oral cancer mortality in developing countries. (Photograph: Matej Kastelic/Shutterstock)

Epigenetics can alter gene expression in cancer cells without changes to the DNA sequence and can cause tumour progression. "This phenomenon is relatively new and understudied, particularly in oral cancer. This study is one of the first to identify epigenetic markers in oral cancer, using cutting-edge approaches," said co-author Dr Aniruddha Chatterjee, Senior Research Fellow and Rutherford Discovery Fellow in the Department of Pathology at the Dunedin School of Medicine at the University of Otago. The findings showed that the arrangement of a certain epigenetic mechanism, called DNA methylation, might be responsible for dictating gene expression and the spread of abnormal cells. "By validating in a larger cancer cohort, we have shown that a subset of these biomarkers is significantly associated with poor prognosis of patients," Chatterjee said.

The age-adjusted incidence of oral cancer in the world is estimated at four cases per 100,000 people, according to the World Health Organization. This oral disease is more common in men and in older people, and varies considerably by socio-economic condition. According to the 2019 report of "India Against Cancer", of the 300,000 cases of tobacco-associated oral cancer detected globally, 86 per cent are from India. Additionally, late diagnosis and poor prognosis are key problems associated with the high mortality rate of this cancer in developing countries. The research group was surprised to find such broad differences in the oral cancer tissue compared with adjacent healthy tissue in the same patients. "We were also surprised to see that small molecules, called microRNA, were methylated or demethylated in the tumours from smokers or chewers or mixed habits, suggesting that therapeutic intervention might be different in patients depending on the way the tobacco was abused," said lead author Dr Roshni Roy, professor in the Department of Pathology at the University of Otago.

Green light for XIVIA Xylitol dental health claims

By DTI

DuPont Nutrition & Health is the first company in South Korea to receive re-approval for xylitol health claims. (Photograph: morisfoto/Shutterstock)

CHEONGJU, South Korea: South Korea's Ministry of Food and Drug Safety has issued a re-approval of the health claim that consumers from 3 to 80 years old of the sweetener XIVIA Xylitol have a reduced risk of dental caries. The manufacturer, DuPont Nutrition & Health, is the first company in the country to receive such re-approval.

In the re-evaluation of the sweetener, the ministry reviewed 146 research reports, including 94 clinical trials, and concluded that XIVIA Xylitol helps reduce the risk of caries at an effective daily dosage adjusted from 10–25 g down to 5–10 g, a similar amount to that of international dental association standards.

In South Korea, functional ingredients that have received a health claim approval undergo a mandatory re-evaluation every ten years. With the latest re-approval, DuPont Nutrition & Health continues to work with manufacturers to create sugar-free products with oral health in mind.

XIVIA Xylitol is claimed to deliver sweetness at 50 per cent of the calorie level of sugar. In addition, it is preferred for its relatively low glycaemic index, which makes it suitable for diabetic and health-conscious consumers. In addition to replacing sugar in chewing gum and other confectionery applications, xylitol is commonly incorporated into oral hygiene products, including toothpaste, mouthwash and teething gels.

AD

Scientists draw inspiration from giant panda teeth

By DTI

SHENYANG/HEFEI/LANZHOU, China/ BERKELEY, Calif., US: Tooth enamel protects teeth over the lifetime of an organism by providing a hard surface resistant to wear and tear and by withstanding impacts without breaking. According to researchers, the giant panda has particularly resistant tooth enamel, which can recover its structure and geometry to counteract the early stages of damage.

The team which investigated the tooth structure of the panda was made up of researchers from the Institute of Metal Research of the Chinese Academy of Sciences in Shenyang, the University of Science and Technology of China in Hefei, Lanzhou University of Technology in Lanzhou and the University of California, Berkeley in the US. They believe their observations could be replicated in the tooth enamel of all vertebrates, including humans, and inspire the design of artificial durable ceramics.

Scientists from China and the US have discovered that hydration is the key to pandas' teeth lasting a lifetime. (Photograph: Hung Chung Chih/Shutterstock)

"Tooth enamel possesses an exceptional durability and plays a critical role in the function of teeth, however, [it] exhibits a remarkably low resistance to the initiation of large-scale cracks comparable to geological minerals," said Prof. Robert O. Ritchie, who led the study.

The ingenious design of the panda's tooth enamel, which has to withstand a daily diet of bamboo—a material of remarkable strength and toughness—comprises parallel micro-scale prisms made up of vertically aligned nanoscale fibres of the mineral hydroxyapatite embedded in an organic-rich matrix. When there is an impact on the enamel, a variety of different deformation mechanisms take place to mitigate the growth of small cracks and prevent the formation of large cracks.

"The tooth enamel is capable of partially recovering its geometry and structure at nano- to micro-scale dimensions autonomously after deformation to counteract the early stage of damage," explained first author Zengqian Liu. "[This] property results from the unique architecture of tooth enamel, specifically the vertical alignment of nanoscale mineral fibres and micro-scale prisms within a water-responsive organic-rich matrix."

Hydration plays a key role in the process. The viscoelasticity of the organic-rich matrix surrounding the mineral prisms and fibres facilitates self-recovery, while the presence of water decreases the width of any cracks that do form, with only a minor cost in terms of hardness.

"Our findings identify a novel means by which the tooth enamel of vertebrates develops an exceptional durability to accomplish its functionality," added Liu. "The self-recovery process represents a new source of durability that differs markedly from the conventional protocol of fracture mechanics."

As the architecture of the panda's tooth enamel is essentially similar to that of other vertebrates, the researchers believe that this self-recovery behaviour is likely to occur in tooth enamel in general. "Our findings also offer inspiration for the development of artificial, durable, self-recoverable ceramic materials," said Ritchie. The team is hoping to develop tooth enamel-inspired self-recoverable durable materials by introducing shape memory polymers at the interface of ceramics.

The study, titled "Hydration-induced nano- to micro-scale self-recovery of the tooth enamel of the giant panda", was published in the November 2018 issue of *Acta Biomaterialia*.

New oral appliance could help manage sleep apnoea

By DTI

Scientists from China and the US have discovered that hydration is the key to pandas' teeth lasting a lifetime. (Photograph: Hung Chung Chih/Shutterstock)

HIROSHIMA, Japan: Researchers have recently developed a novel treatment to improve the quality of sleep for patients who suffer from mild to moderate obstructive sleep apnoea (OSA). Using 3-D imaging of the airways with the patients supine to simulate sleeping conditions, the study confirmed that the treatment is effective at opening the airways and warrants further collaboration between dentists and doctors in the treatment of sleep apnoea.

The treatment was developed by researchers from the Department of Orthodontics at Hiroshima University Hospital. The participants included eight men and five women who were diagnosed with mild to moderate OSA and underwent mandibular advancement appliance (MAA) therapy. The researchers used multi-slice computed tomography in order to measure the regional effects of the appliance on the upper airway.

"This is like when you have to use glasses. You have to wear them every time you want to see properly so [patients] have to wear this appliance every time [they] want to sleep better," said study co-author Dr Hiroshi Ueda, an associate professor in the Graduate School of Biomedical and Health Sciences at Hiroshima University.

Previous research typically measured patients standing up, a technique that does not simulate sleeping conditions. The current study measured the change in airway space of patients lying flat. It demonstrated that the proportional size of the soft-tissue volume, that is, the soft palate and tongue in the oro-hypopharyngeal region, significantly decreased when the patient was wearing an MAA. This forward displacement of the soft tissue thereby increased the retro-glossal airway space, except the nasopharynx, three-dimensionally and therefore allowed for easier breathing.

According to the researchers, further investigations that focus on 3-D airway enlargement analysis of various sites affected by MAA therapy are required in a larger number of patients with OSA. This would help scientists understand the pathogenesis of OSA and the clinical applicability of MAA fully.

The study, titled "Multislice computed tomography assessment of airway patency changes associated with mandibular advancement appliance therapy in supine patients with obstructive sleep apnea", was published online on 3 March 2019 in *Sleep Disorders*.

State government bans advertising of junk food on publicly owned space

By DTI

BRISBANE, Australia: An unhealthy diet can be a contributing factor to poor oral and general health, and advertising plays a key role in this regard. Seeking to curb this, the Queensland government has announced a ban on the promotion of unhealthy food and drinks on the advertisement spaces it owns. The move is the first of its kind by an Australian state.

In a move that is the first of its kind in Australia, the Queensland government has announced a ban on the promotion of unhealthy food and drinks on the advertisement spaces it owns. (Photograph: beats1/ Shutterstock)

Rethink Sugary Drink, a partnership of 19 leading health and community organisations, including the Australian Dental Association, praised the decision. In a statement, Craig Sinclair, head of the prevention division at Cancer Council Victoria, a partner of Rethink Sugary Drink, placed particular focus on the need to provide supportive, healthy environments for children where the considerable negative impact on sugary drinks can be tackled.

"Whether that is on their walks to school, while waiting for the bus or even when visiting sports and community centres, the presence of sugary drink marketing is overwhelming, making messages about healthier options more difficult to hear," noted Sinclair.

In addition to praising the decision by the Queensland government, Rethink Sugary Drink recommended a public education campaign supported by government that highlights the health impacts of consuming drinks high in sugar. The group also proposed comprehensive mandatory restrictions by state governments on the sale of sugar-sweetened drinks, as well as increased availability of free water, in schools, government institutions, children's sports and places frequented by children. In addition, Rethink Sugary Drink suggested the creation of state and local government policies that reduce the availability of sugary drinks in workplaces, government institutions, healthcare settings, sports and recreation facilities, and other public places.

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Lower socio-economic groups in New Zealand cannot afford urgently needed dental procedures

By DTI

AUCKLAND, New Zealand: Socially disadvantaged adults in New Zealand cannot afford dental treatments, even if in great pain, resulting in dangerous do-it-yourself procedures. Consequently, various representatives of the health sector are calling for the government to take action.

In a recent statement, the New Zealand Dental Association (NZDA) called for better government funding to enable low-income adults to access dental care. Even though New Zealand adults have experienced great improvements in oral health since the 1980s, still many patients only visit a dentist when a dental problem occurs, and in particular, low-income adults see the cost as a significant barrier.

"Some truly cannot afford care, and for these groups we must do better, and that involves working with government on a better deal," said Dr Bill O'Connor, President of the NZDA.

The New Zealand Dental Association is urging the government to provide affordable dental care for adults. (Photograph: Andrey_Popov/ Shutterstock)

Mike Naera, health advocate in Rotorua, commented: "Maori are over-represented in the lower socio-economic demographic and they sacrifice everything so they can live day-to-day. A lot of [them] can't afford dental work so their options are to remain in pain or extract their teeth themselves. The consequences of paying for dental care would be sacrificing food on the table. The government should be looking for more ways to better subsidise dental work so our families don't have to keep suffering."

According to Dr Sherry Sembhy, from Rotorua Dentists, self-dentistry is dangerous, as people do not know what they are doing, do not understand the anatomy of their teeth and use unsterile tools, which make the condition only worse. Infections, abscesses, swelling and broken teeth and jaws were some of the possible outcomes of the home procedures which Sembhy said could end up costing even more in repairs.

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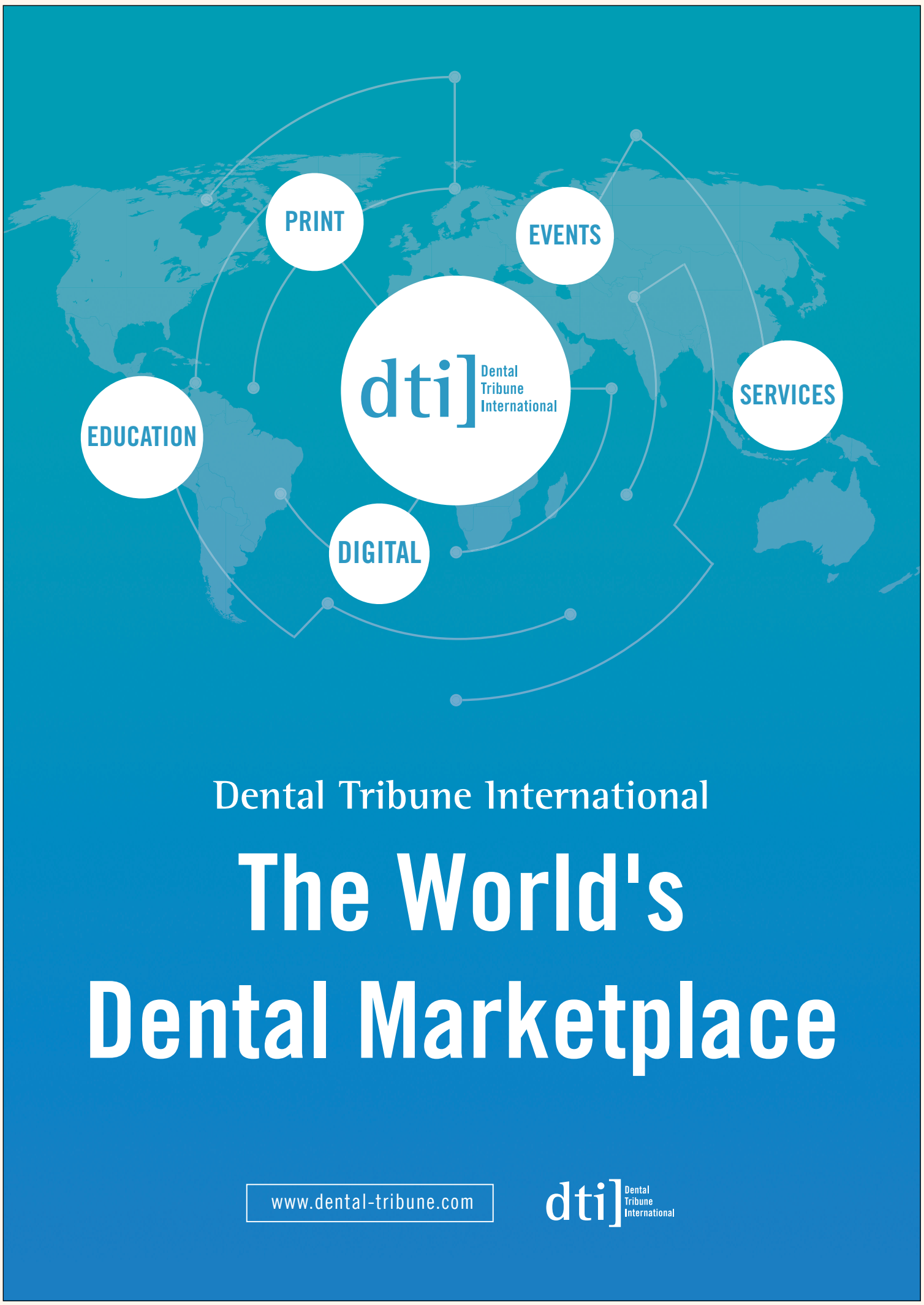

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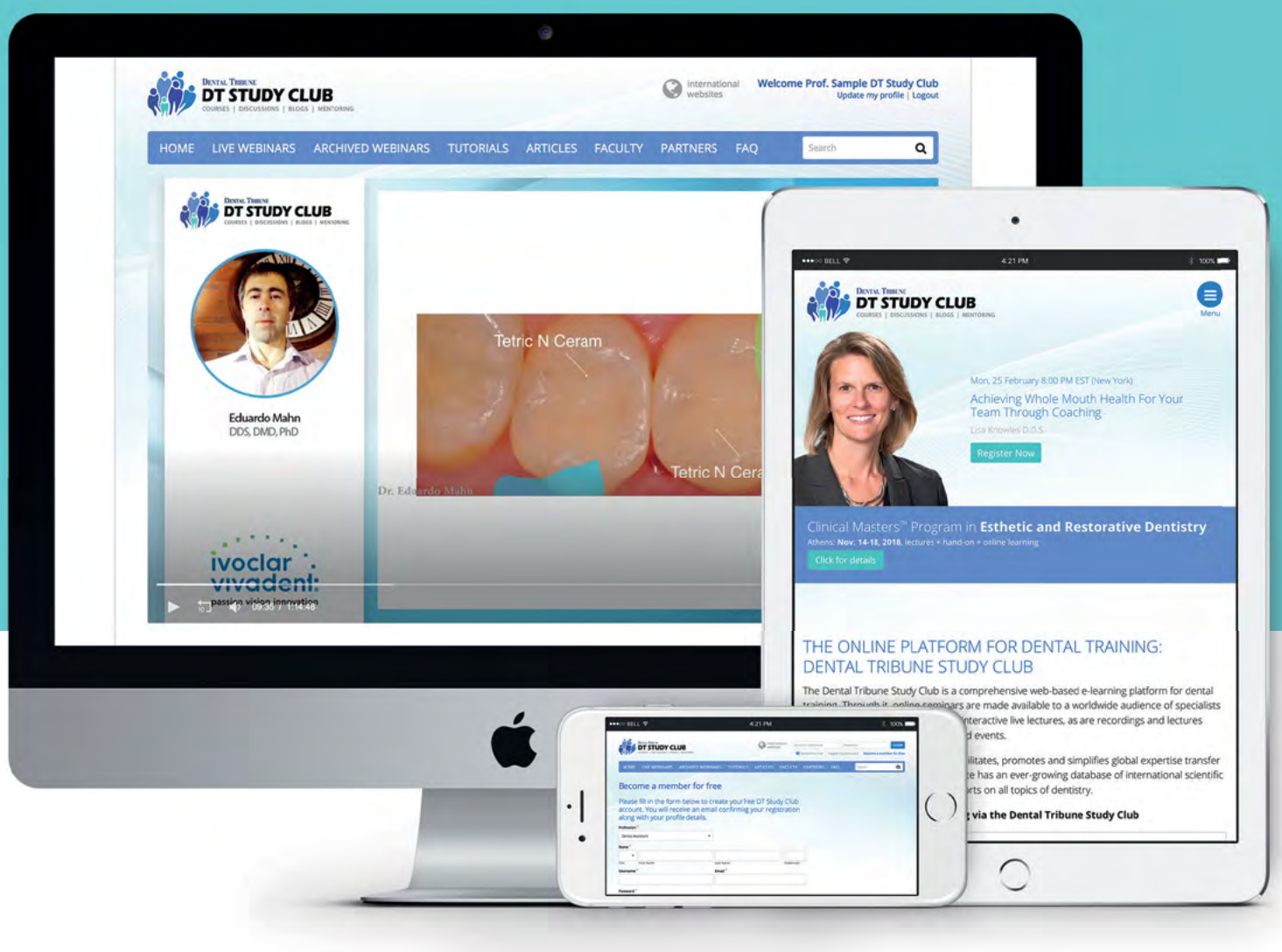

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dti Dental Tribune International

W&H Australasia expands its sales range

"With the extension of the offer customers benefit from innovative technologies "Made in Austria" as well as high-quality W&H support and service", says W&H Australasia General Manager Martin Rolfe. Photo: © W&H

With surgical devices such as Implanted or Piezomed W&H offers dentists high-quality products that are characterized by powerful motors, innovative features and maximum safety. Photo: © W&H

From March 2019, W&H Australasia Pty Limited, a subsidiary of the international W&H Group, starts the distribution of the W&H Oral Surgery and Implantology (OSI) product range in Australia. Customers benefit from innovative technologies "Made in Austria" as well as high-quality W&H support and service.

Since June 2018, W&H Australasia Pty Limited has been the exclusive distributor of Miele thermal washer disinfectors (TWD) in the dental field. W&H Australasia is now expanding its sales activities in the OSI application area to include W&H surgical devices, W&H surgical straight and contra-angle handpieces, Osstell products as well as accessories and consumables. The merchandise are distributed through a national dealer structure specialising in OSI distribution. The W&H Service Centre is designed, equipped and staffed to meet the high W&H service standards. For support and service, W&H is available by the following service number: 1300 613 988. "I´m very pleased about the extension of the offer. With the OSI product portfolio, including the Implantmed with the Osstell ISQ module, W&H provides the relevant functionality and reliability expected from the profession. In addition to the W&H Service Centre, W&H offers measurable added value to the OSI end-users", says W&H Australasia General Manager Martin Rolfe.

Exciting time ahead

The expansion of the sales portfolio to include W&H OSI products is the first step in 2019. Already in May, a further expansion of the W&H Prophylaxis & Periodontology program is planned. W&H's product range in the Restoration & Prosthetics, as well as in the dental Sterilization & Hygiene application fields continues to be available through A-dec Australia.

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Researchers find effective way to teach visually impaired children oral hygiene

By DTUK

BELAGAVI, India: An adapted approach is required to train children with visual impairment in oral hygiene and to motivate them to care for their teeth regularly. Researchers at the KLE Academy of Higher Education and Research in Belagavi have tested different approaches to oral hygiene training and compared their effectiveness.

For the study, 90 visually impaired children between the ages of 12 and 15 were selected and randomly assigned to three equal groups. The first group was trained with verbal and tactile stimuli and playful teaching methods, the second one was trained using braille, while the third group received a combination of these two approaches.

The best method of educating visually impaired children on oral health is by using a combination of different stimuli, a study has found. (Photograph: wavebreakmedia/Shutterstock)

The researchers tested the dental hygiene of the children by assessing plaque and gingival status at different intervals. The first assessment was after 21 days and the final one took place after nine months. In addition, before and after the training, the children had to fill out questionnaires which recorded their knowledge and practice of oral hygiene and their attitude towards it.

The researchers found that the combined hygiene training in the third group reduced the children's plaque and gingival scores by 55 and 52 per cent compared with the other two groups. In addition, not only did the children's practical implementation improve, but their knowledge of the subject and their attitude towards it did too.

The study, titled "Effectiveness of different oral health education interventions in visually impaired school children", was published in the March 2019 issue of *Special Care in Dentistry*.

New research provides faster cheaper method to treat periodontitis

By DTI

Researchers in Japan have developed a new method to treat periodontitis that they believe will be faster, cheaper and more effective than anything available today. (Photograph: Sergii Kuchugurnyi/Shutterstock)

SENDAI, Japan: Periodontitis affects many people and can have serious effects on oral health. In new research originating from Japan, scientists have developed a cell-based regenerative therapy approach. The proposed therapy design promises to address periodontitis without some of the shortcomings and limitations of regenerative therapies to date.

According to the researchers from Tohoku University in Sendai, the therapy will be faster and cheaper. "The use of cell-based therapies is a promising approach to treat human disease. This kind of treatment paradigm is important because commercially available stem cells that represent a cell-based therapy specifically developed to treat periodontal tissue regeneration will reduce time and cost while improving quality assurance," said lead author Prof. Masahiro Saito, from the Department of Restorative Dentistry at Tohoku University Graduate School of Dentistry.

In a new approach to the treatment of periodontitis, the researchers transplanted stem cells from healthy mini pigs to those who had periodontal defects and, by doing so successfully, overcome the shortcomings that can be associated with autologous stem cell treatments. By using this mini pig periodontal defect model, they demonstrated that allogeneic adipose-derived mesenchymal progenitor stem cells (ADMPCs)—mesenchymal stem cells (MSCs) derived from fat tissue—are safe and effective for the treatment of periodontitis.

"Our study demonstrates that ADMPCs appear to be safe and not triggering an immune response in allogeneic settings, and as such it explores the potential use of allogeneic MSCs for tissue regeneration. The study is a powerful first step towards further development of stem cell-based therapy for the treatment of periodontal disease," explained Saito.

The study, titled "Periodontal regeneration by allogeneic transplantation of adipose tissue derived multi-lineage progenitor stem cells in vivo", was published on 29 January 2019 in *Scientific Reports*. The study was conducted in collaboration with researchers from Osaka University in Osaka and Fujita Health University in Toyoake.

Study links frailty to poor oral health

By DTI

MELBOURNE, Australia/LONDON, UK: It is widely known that poor nutrition is a risk factor for frailty. Similarly, the link between nutrition and oral health status has been established in numerous studies. New research has bridged the gap between these two relationships, however, and found that poor oral health is independently associated with frailty.

New research shows that elderly people who suffer from frailty are substantially more prone to issues with their oral health. (Photograph: Lisa S./Shutterstock)

The study, conducted by researchers at the Monash Aging Research Centre at Monash University in Melbourne, assessed the oral health, nutrition and frailty of 168 hospitalised geriatric patients over six months using previously validated tools.

The results show that elderly people who suffer from frailty are substantially more prone to issues with their oral health. Frailty is linked to a reduced ability to bite and chew food, as well as sensitivity to hot and cold food and drink. The study also revealed that frail adults are more likely to feel self-conscious about their teeth, gingivae or dentures and are less likely to access dental care.

Previously, experts have identified a relationship between frailty and difficulties with speech and with taking medication for oral pain.

Dr Nigel Carter, OBE, Chief Executive of the Oral Health Foundation, a UK-based charity, stated in a press release regarding the study that the oral health of older people remains an ongoing issue.

"In the UK, people are living longer than ever before. This will increase the amount of poor health, frailty and disability. In turn, it will create a series of challenges for how we care for the population's oral health," he said.

"The first problems to occur are often because of a loss of dexterity. Limited mobility, no matter how small, can have an extremely large effect on our ability to care for our own health. In terms of oral health, this means effective toothbrushing becomes much harder. Balanced nutrition also becomes more difficult," he continued.

Carter called on the UK government to provide greater access to dental services for frail adults in hospitals, as well as for those in nursing homes, and to provide better oral health training for carers. "The government must find such proactive solutions if they are to address the health needs of an ageing population," Carter stated.

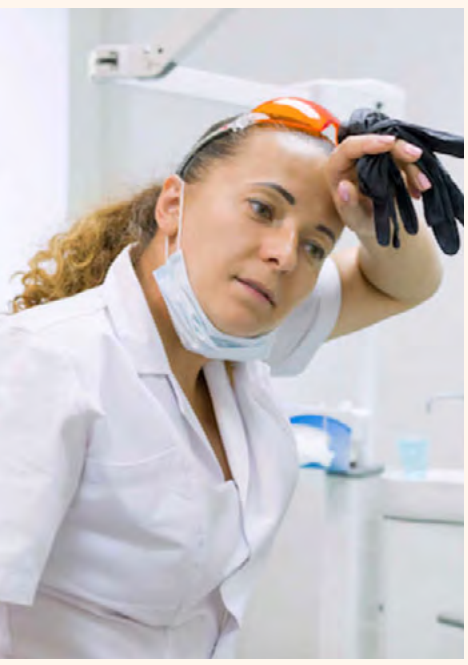
The study, titled "Frailty, oral health and nutrition in geriatrics inpatients: A cross sectional study", was published online in *Gerodontology* on 12 March 2019 ahead of inclusion in an issue.

Survey shows fear of being sued often leads to stress and anxiety for dentists

By DTUK

LONDON, UK: Often, dentistry-related stress is only looked at through the lens of the patients' experience and their fear of dental procedures. A recent survey, however, has found that there is an entirely different source of stress and anxiety for dental professionals in the UK: the fear of being sued, receiving a claim or complaint, or being the subject of an investigation by the General Dental Council.

The survey was conducted by Dental Protection, part of the not-for-profit Medical Protection Society for doctors, dentists and healthcare professionals. It asked more than 1,100 UK-based dentists for feedback regarding the sources of their work-related stress, and 77 per cent responded that the fear of being sued by an unsatisfied patient had caused them to become stressed and anxious.



A recent survey of more than 1,100 UK-based dentists found that the fear of being sued by an unsatisfied patient is a primary source of work-related stress. (Photograph: VH-studio/Shutterstock)

The results of the survey come just months after the findings of an analysis published in the British Dental Journal showed that general dental practitioners exhibit the highest levels of stress and burnout among UK dentists. The findings of this research suggested that, while practice ownership could possibly reduce burn-out due to regulatory stress, it does not positively influence patient-led stress for dentists.

Remarking upon the findings of the survey, Dr Raj Rattan, MBE, Dental Director at Dental Protection, said: "Stress can impact on a dentist's health and practice in a number of ways. It can affect confidence, clinical judgement, morale and even lead to performance issues. Research confirms that high stress levels affect performance and increase the potential for adverse outcomes of error. These may in turn spark patient complaints and claims and a self-perpetuating vicious circle is established."

"Modern life is full of challenges, stressors and pressures—and the dental profession is no exception. Dental Protection would like to encourage dentists to seek help and advice to manage the condition before it causes irreversible changes to health and well-being," he concluded.

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