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Vitamin D intake may halt periodontal disease progression

BOSTON, Mass., USA: Vitamin D has become a controversial nutrition issue, as studies have shown that it has potential benefit for physical and oral health. Now, new research from the US has suggested that the anti-inflammatory mediator is associated with periodontal health, especially in older men.

The study included 562 male participants in the Department of Veterans, Affairs Dental Longitudinal Study (mean age 62.9), who were examined one to four times between 1986 and 1998. In order to determine the link between total vitamin D intake and periodontal health, a calibrated examiner measured probing pocket depth and attachment loss around each tooth. In addition, alveolar bone loss was determined from radiographs.

The researchers observed that total vitamin D intake (≥800 IU) was associated with a lower risk of severe periodontal disease and moderate to severe alveolar bone loss. They concluded that vitamin D may help protect against the progression of periodontal disease.

Vitamin D has previously been linked to several cardiovascular risk factors, including hypertension, abnormal lipids, and obesity. Its role in preventing bone diseases, such as osteoporosis, is well documented. Moreover, recent studies have suggested that increased intake of vitamin D may reduce the risk of dental caries, various cancers, and diabetes.

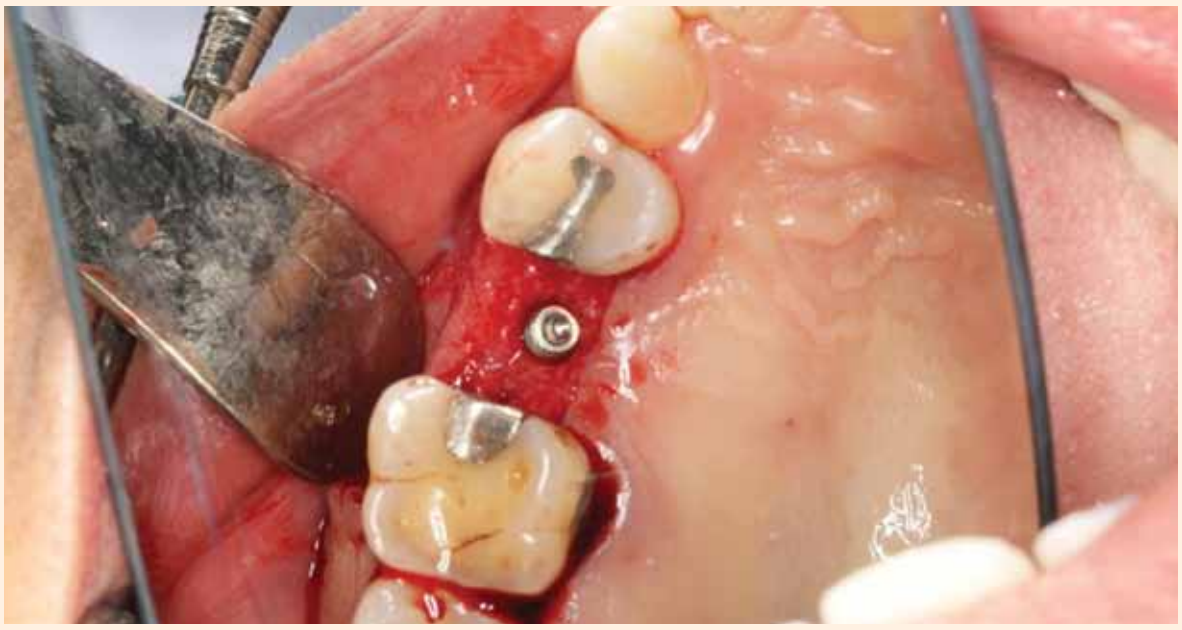
The present study was conducted at Boston University's Henry M. Goldman School of Denta.DT

Vitamin D is produced endogenously within the epidermal layer of the skin as a result of UVB radiation. However, some individuals require additional vitamin D from dietary and supplemental sources. (Photo: Bambuh/Shutterstock)

Synthetic membrane could accelerate healing after dental implants

JERUSALEM, Israel: REGENECURE, an Israeli specialist in bone reconstruction, has developed a new membrane as a bone-stimulating aid for patients requiring dental implants. As preliminary studies have shown promising results, the membrane will go into clinical trials now. The company hopes that the new technology will help improve and accelerate healing in a variety of medical procedures.

Over a period of six months, researchers at the Hadassah Medical Center in Jerusalem and the Rambam Health Care Campus in Haifa will compare the amount of lateral bone fill generated by REGENECURE's membrane with that generated by collagen membranes, the company announced. The study will include 32 smokers and non-smokers with insufficient bone volume, a common problem in tooth replacement with dental implants. In half of the participants, the newly developed synthetic membrane will be used, while the other half will receive collagen membranes, which is considered the gold standard in treatment today.



Lack of sufficient bone volume to house the implant is a common problem in patients undergoing tooth replacement. Bone substitutes supporting the implant need to be held in place by a membrane. (Photo: greenbutterfly/Shutterstock)

According to REGENECURE, the innovative AMCA (ammonio methacrylate copolymer type A) guided bone regeneration dental membrane has advantages over collagen membranes regarding quality and safety. It degrades slowly over time, giving the natural bone more time to properly regenerate, is entirely synthetic, and eliminates the risk of contamination by pathogens present in membranes derived from animal tissue.

In addition, the membrane accelerates healing by enabling cell adherence, proliferation, and differentiation of stem cells in the bone tissue, while preventing connective tissue from infiltrating the healing space. The company emphasised that the membrane is easy to use in orthopaedic surgery and requires no special surgical knowledge of preparation.

According to a recently published report by Research and Markets, a publisher of international market research and market data, the global dental implants market is projected to exceed US$6.5 billion (€5 billion) by 2018.DT

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Digital dentistry in dental prosthetics is growing rapidly in the US

by Dr. Kamran Zamanian and Kathryn Mashevich, iData Research

Despite recovering from a formally recessed US market, many patients continue to opt away from expensive, elective dental procedures. The market for dental prosthetics, encompassing crowns, bridges, inlays/onlays, veneers, and dentures has remained relatively stable over the past couple of years. However, economy products such as monolithic restorations produced with CAD/CAM technology are driving unit sales.

Digital manufacturing allows laboratories to increase output while decreasing labor costs, permitting them to lower the cost of the final restoration and gain a competitive advantage. A monolithic Zirconia crown is priced at around $100, which is $50 less than a zirconia crown fabricated through traditional methods. Patients are choosing the most affordable dental prosthetics, which means monolithic restoration sales will continue to rise. Consequentially, laboratories and dental offices continue to go digital. In response, manufacturers of CAD/CAM technology are continuously innovating and releasing new products.

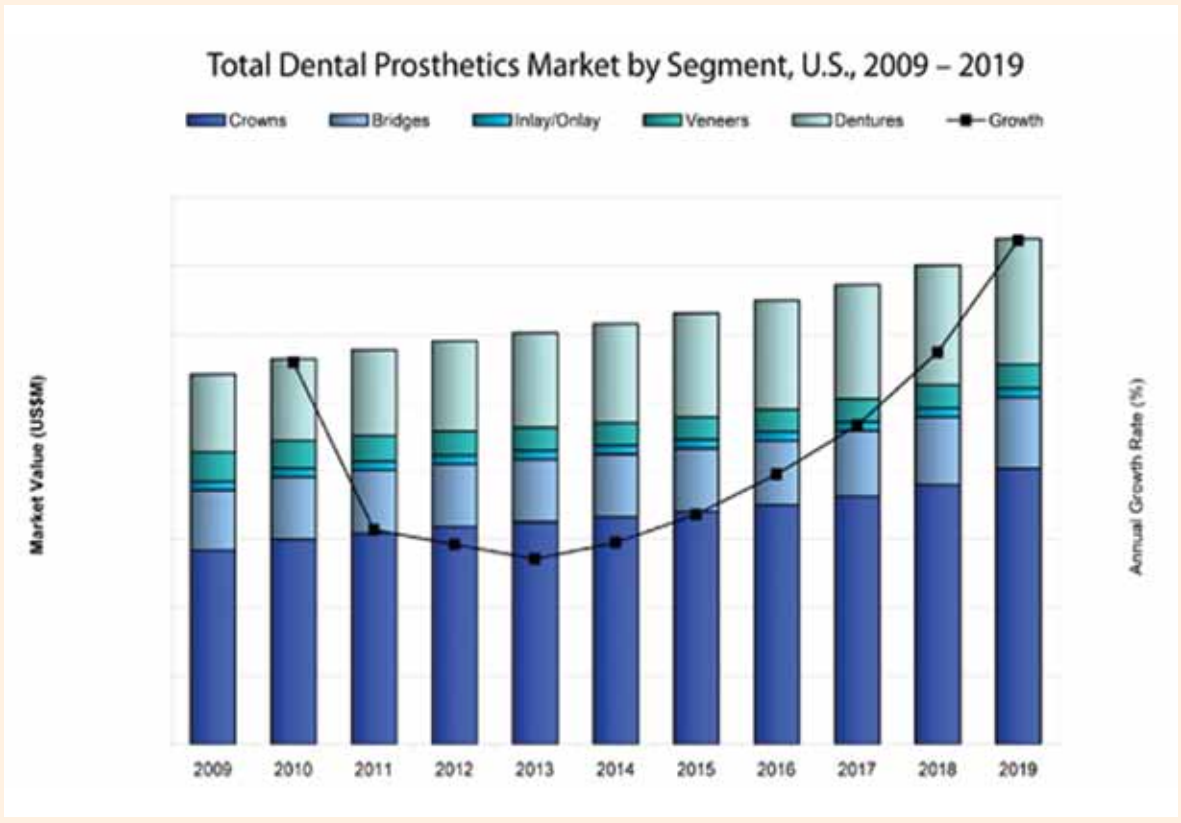
How significant is the trend toward all-ceramic and monolithic restorations in driving the CAD/CAM market?

Crowns and bridges total nearly 80 percent of the market of all dental prosthetics in the US Since 2010, the unit share of all ceramic restorations of crowns and bridges has increased by 20 percent. The most popular ceramic materials today include zirconia, specifically Glidewells bruxZir, and lithium disilocate e-max by Ivoclar Vivadent.

Fortunately for patients, ceramic materials are consistently improving in strength and aesthetic quality, while decreasing in price. Today, zirconia is available in up to 16 different shades. The shift to all ceramic restorations is cannibalizing the porcelain fused to medal market (PFM), as gold and precious medals, such as palladium and platinum, continually undergo steep price increases. It's estimated that by 2019, the majority of restorations will be fabricated from zirconia and glass ceramics, and the dominant share of the restorations will be monolithic.

What is new and exciting?

In response to the demand for monolithic restorations, 2012 demonstrated a number of new developments in digital dentistry. Intra-oral digital scanners are improving quickly to capture the eye of doctors who previously hesitated about working with new technologies. When intra-oral digital impression scanners first entered the market, they presented an opportunity to increase efficiency drastically in dental offices, however, they also came with a steep learning curve for dentists and dental assistants.



(DTI/Graphic provided by iData Research

The dentists needed to spend time learning how to use the technology correctly before increases in efficiency and productivity would be evident. Recent developments have addressed this inhibiter. The new iTero scanner from Cadent has been released, as well as 3Shapes new Trios system in Europe, and the Sirona Omnicam. These scanners are a lot less technical, simplifying the scanning process.

Marketing user-friendly scanners is the current strategy within intra-oral digital impression taking. Sirona is advertising the CEREC Omnicam as "scanning simplicity," and 3Shape ensures to inform consumers that "scanning has never been easier," when advertising their new Trios scanner. The Trios scanner is currently only available in Europe, but is expected to enter the North American market soon. Finally, even the new IOS FastScan from Glidewell laboratories, which recently purchased IOS Technologies, describes the "four easy steps" for using the scanner.

Not only are scanners becoming simpler to use, but they are more advanced overall. The scan no longer needs to be processed overseas before it can be sent to a U.S. dental laboratory. In addition, the click fee per scan has disappeared. The scanning process is faster, more efficient, and less expensive. Furthermore, newer models are equipped with the ability to record video clips to present to the patient when prescribing treatments. Currently, unit volume for intra-oral digital impression-taking is expected to grow at a CAGR of almost 20 percent.

As intra-oral digital impression taking becomes more popular with dentists, laboratories will see a greater volume of digital files and will be more likely to invest in a CAD/CAM full in-laboratory system or scanning unit. Therefore, an increasing popularity of intra-oral digital impression scanners will help drive the entire CAD/CAM system market and also the market for rapid prototyping systems.

What is the fastest growing market segment?

CAD/CAM technology has moved into dentures. Global Dental Sciences LLC has developed AvaDent Digital Dentures, a complete CAD/CAM system used to produce removable dentures. Currently, Avadent is the only firm using the new technology and laboratories have already expressed interest in buying should the device receive FDA approval. The denture market is expected to be the fastest growing segment in dental prosthetics over the next ten years. The combination of an aging population and an economic recession is leading patients toward removable dentures, which are more affordable than full implant solutions. Over the next few years, dentures will enter the digital world and be designed and milled with CAD/CAM technology. The manufacturing process will become faster and more accurate, similar to the way CAD/CAM has transformed the market for fixed prosthetics. Patients will be able to receive their dentures in only two appointments. Furthermore, with a permanent digital record of the denture, a broken denture can be fixed quickly.

Conclusion

Ceramic and monolithic restorations will significantly drive the CAD/CAM market over the long term as patients choose more affordable options. Within this $12 billion market, numbers of intra-oral digital scanners will grow as dentists incorporate new user-friendly equipment into their practices. Dentures will prove to be the fastest growing market as baby boomers age.

Over the past century, the percentage of the U.S. population over the age of 65 has more than tripled. In general, mature markets, such as the one for dental prosthetics, tend to grow at a similar rate to the overall economy. Although CAD/CAM technology has been used in the dental industry for over twenty years, recent developments are making the technology much more efficient and cost-effective, promising overall market growth.

Additional information

The information contained in this article is taken from a detailed and comprehensive global report series published by iData Research, titled "U.S. Markets for Dental Prosthetics and CAD/CAM Devices." iData Research is an international market research and consulting firm focused on providing market intelligence for the medical device, dental and pharmaceutical industries. DT

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Study finds no differences in children treated with composites or amalgam

WATERTOWN, Mass., USA: In contrast to prior studies, which had demonstrated that resin-based composite dental restoration materials may impact children's physical growth by releasing bisphenol A, an endocrine-disrupting chemical, an analysis of the same data has found no significant differences in physical development of children treated with either composites or amalgam.

Researchers at the New England Research Institutes tested whether dental restoration materials affect children's growth using a secondary analysis of a study that was conducted as a part of the New England Children's Amalgam Trial, one of only two randomized clinical safety trials in the U.S. to address the potential impact of mercury exposure from amalgam restorations on neuropsychological and renal function in children.

The researchers investigated data from 218 boys and 256 girls aged 6 to 10 with two or more decayed posterior teeth that were randomly treated with amalgam or composite.

"Overall, there were no significant differences in physical development over five years in children treated with composites or amalgam," the researchers said. For instance, the results showed no significant differences between treatment assignment and changes in physical development in boys with regard to body mass index, body fat percentage and height velocity.

However, they found that girls treated with composites had a lower risk of menarche during follow-up. Additional studies examining these restoration materials in relation to age at menarche are warranted, the researchers said.

The study was published online on Sept. 12 in the Journal of Dental Research ahead of print. DT

Researchers from the U.S. have found normal physical development in children treated with composites or amalgam. (Photo courtesy of Kacso Sandor/Shutterstock)

Early BPA exposure may adversely affect formation of tooth enamel

PARIS, France: New research from France has suggested that bisphenol A (BPA), a chemical widely used in plastics and dental resins, is a potential causative agent of molar incisor hypomineralisation (MIH). Damage similar to this mineralisation disorder, which occurs selectively in permanent incisors and first molars, was observed in rodent teeth after treatment with BPA.

Researchers from the National Institute of Health and Medical Research treated the incisors of rats daily with low doses of BPA (5 µg/kg/day) from birth to 30 or 100 days. At day 30 already, the erupting tooth enamel exhibited signs of hypomineralisation similar to human MIH. The researchers suggested that BPA disrupts normal protein removal from the enamel matrix and leads to mineral depletion, making the teeth more fragile.

However, no such effect was observed in 100-day-old rats. As their erupting incisor enamel was normal, the scientists suggested that enamel formation is only sensitive to MIH-causing agents during a specific time window in early development.

As it is strongly suspected that BPA has the same effects on humans as on laboratory animals, it could be a causal agent of MIH, concluded Dr Sylvie Babajko, a research director at the institute.

The condition is found in roughly 18 percent of children aged between 6 and 8. The permanent maxillary central incisors and first molars are affected most often, and the permanent mandibular incisors less frequently. Usually, the teeth show a yellowish-white to brown discoloration, which may affect only certain areas of the tooth or the whole tooth. The teeth of MIH children are commonly hypersensitive to pain and more susceptible to cavities.

Endocrine-disrupting chemicals, including BPA, are ubiquitous environmental pollutants and increasingly associated with health concerns. Prior studies have associated it with adverse effects on reproduction, neurological development, and metabolism. The manufacture and marketing of babies' bottles containing BPA were banned in Europe in 2011. The prohibition will be extended to all food containers in France from July 2015.

The study, titled "Enamel defects reflect perinatal exposure to bisphenol A", was published online on 10 June in the American Journal of Pathology ahead of print. DT

Lines on a maxillary incisor attributed to differences in mineralisation during amelogenesis. (Photo courtesy of Politikaner)

1st Place for DMG's LuxaCore Z

The June issue of the American trade publication "The Dental Advisor" focused on composites for core build-up*. Fourteen materials were clinically tested and evaluated. First place went once again to a material that has already been the recipient of many awards: LuxaCore Z-Dual.

DMG's dual-cure composite for core build-up and root post cementation attained a top rating of 98%. The assessment reflects the verdict of 32 testers from the field, who used the material in 450 clinical cases. LuxaCore Z-Dual was also highlighted as a preferred product in "The Dental Advisor Recommends".

The most outstanding feature of LuxaCore Z-Dual is that its mechanical properties virtually match the natural tooth; the material cuts like dentine. Thanks to specialized nanotechnology and zirconium dioxide, the compressive strength, and cuttability values of its award-winning predecessor, LuxaCore-Dual, have been improved even further.

Detailed information on LuxaCore Z can be found at www.dmg-dental.com

*The Dental Advisor, June 2012, Volume 29, No. 05.

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The filter principle: Is every patient a finals patient?

Simon Hocken
UK

"Your work is going to fill a large part of your life, and the only way to be truly satisfied is to do what you believe is great work. And the only way to do great work is to love what you do. If you haven't found it yet, keep looking. Don't settle.

As with all matters of the heart, you'll know when you find it. And, like any great relationship, it just gets better and better as the years roll on. So keep looking until you find it. Don't settle."

Steve Jobs, CEO of Apple Inc. in 2005

You remember finals, don't you? Of course you do. Your examiners carefully selected a patient(s) for you to examine and diagnose and for whom to present a treatment plan. The finals patients were unlucky enough to have more than one dental problem and you were marked on finding all of them and your ability to determine a set of solutions for the patient.

Afterwards, most of us headed off into practice, where a series of finals patients are paraded in front of us on a daily basis. Now these patients willingly pay us to make our professional judgements, offer our best solutions and suggest a fee for doing the dentistry.

However, that's not always what happens, is it?

There's something that happens in general dental practice (be it public like the National Health Service [NHS] here in the UK, mixed or private practice) that is rarely spoken about in dental magazines, online forums or even at the bar at dental conferences. And it's this: many dentists consult with, examine, diagnose, and treatment plan their patients, not in the way that they did for their finals patient, but by applying some sort of filter—a filter of which the patients are completely unaware. Such filters have several elements and in my 25 years of being a dentist, followed by ten years of coaching dentists, I think I've probably heard or seen them all, or at least their effects.

The filter may have some or all of these components:

1. Will the patient like me if I tell him about all of this?
2. Will the patient come back if I tell him about all of this?
3. Will the patient think I am overprescribing?
4. (For returning patients) If I tell the patient about all of this now, will he wonder why on earth I haven't mentioned it before?
5. Will the patient be willing to pay for all of this?
6. If I persuade the patient to have the big treatment plan, what happens if it goes wrong?
7. As long as I make a note on the records, I am keeping myself within the legal rules.

The enemy within here is fear, and not the patient's but the clinician's. And so the filter is applied and the patient is offered the treatment plan that the clinician believes is absolutely necessary or the one he feels the patient needs. Presumably, he leaves the rest until such treatment becomes (as he deems it) necessary or needed. An additional filter, of course, is the one that pushes the dentist towards offering treatments that are well paid or earn the most number of units of dental activity.

Let me run this analogy past you.

Imagine taking your three-year-old, £25,000 car in for a 30,000-mile service. During the course of this, the technician discovers that as well as the regular service items needed, your car also has two sets of worn brake pads. In addition, the front brake discs are warped, the rear dampers are leaking and two tyres are nearly at their worn-tread marks.

As a customer, which of these phone calls would you like the garage to make?

1. The call that lists the faults, your options and the costs for having everything put right?
2. The call that tells you about the faults they think you will want to hear?
3. The call that tells you about the faults that you will be able to see?
4. The call that tells you about the faults they think you will be willing to have fixed?
5. The call that tells you about the faults that will earn them the biggest margin?

And what will the garage do about the faults they don't tell you about? Perhaps, put a 'watch' on their records and consider telling you at the next service?

Duty of care

I know that some of you will be wincing already at my comparison between a clinician and a mechanic but there's more mileage in this analogy still to come. After paying for just the service, you drive off from the garage with the faults left unreported. A child runs out in front of your car and you fail to stop in time because of the worn tyres/brake pads/discs/dampers. In the investigation that follows, these things come to light and spark a witch-hunt.

A good garage owner dare not risk this and the inevitable damage to the garage's reputation. He takes his duty of care seriously and must tell you exactly what the garage has found wrong with your car. So what's really going wrong when a patient leaves a dental surgery with half a treatment plan? In my opinion, this happens because we've lost the simple, straightforward, trusting relationship between patient and clinician that we had as a final-year student. External circumstances, such as insurance companies, the economy, the practice finances and, probably most importantly, our lack of confidence and self-esteem have filtered our behaviour so that we agree to compromise our professional skill set and integrity in order to be liked, keep the patient or stay within our comfort zone.

> "We agree to compromise our professional skill set and integrity in order to be liked."

So, how does that sound? Not so great from where I'm sitting and let's not tell the national newspapers. When I left the NHS in 1992, I decided to get rid of all the filters I had acquired, and simply show and tell my patients what I could do for them as if they were one of my family and money and time weren't an issue. I've used exactly the same approach in my coaching practice. I was lucky enough to be mentored by some great coaches on the idea that you often do your best coaching just before you get fired (for telling it like it is). And that's what I do for our clients.

In my view, you have to decide what sort of dentist you want to be: either an anxious single-unit, one-tooth-at-a-time dentist, forever destined to gross a thousand pounds a day, whilst complaining that patients don't want your treatment; or a dentist who communicates clearly and straightforwardly with your patients about what you can see in their mouths and the best way to fix it, thereby giving them back their responsibility for their health and leaving the decision about whether to proceed with them. DT

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Teeth equally perceived by dentists

DTI

BERLIN, Germany: Several morphometric studies have proven sexual dimorphisms in human teeth, for example that women's teeth are smaller than men's teeth. The German Society for Sex-Specific Oral and Maxillofacial Surgery recently reported on a study that found no obvious differences between male and female teeth.

Headed by Prof. Ralf J. Radlanski from the Centre for Oral and Maxillofacial Surgery at the Benjamin Franklin Campus of Charité Universitätsmedizin Berlin, the researchers explored whether the sex of an individual could be identified if only the front teeth were considered. This was tested by having participants evaluate 50 images of the anterior oral region of men and women aged between seven and 75. The lip area was not shown.

The participants included dentists, dental technicians, dental students and dental professionals, as well as 50 people who had no professional dental background.

The results overall demonstrated that sex could be detected in only about 50 percent of the images. Although there are anthropological studies that claim to prove measurable morphometric differences, the study proved that those are not even visible to experts' eyes.

While some tooth positions were correctly assigned by 70 percent of the participants, others were wrongly assigned by the same number of participants. The assumption that women tend to have rounded teeth and men rather angular ones could not be confirmed by the study. Furthermore, contrary to what was expected by many of the participants, shape, size, and colour of the canines were not meaningful indicators of sex.

"In everyday practice, it is relevant whether the restoration fits the patient's face but not whether the patient is male or female," Radlanski said. "Recognisable typical male teeth or female teeth do not exist." DT

The way forward

Prof. Urs Belser
Switzerland

General dentistry has undergone major changes during the last 20 years, not just in the way clinicians treat their patients, but particularly in the way patients request treatment and their increased expectations of outcomes. In particular, the practice of restoring patients' compromised teeth has become less complex in some ways, yet more challenging in others. Tooth replacement is increasingly being performed through the use of restorations supported by dental implants, and numerous elegant and predictable clinical approaches to this have been developed.

The increase in the use of dental implants is also partly due to the developments in the design of the implants themselves and of the components available to complete the restoration.

All of these advances, however, would be of little use without well-defined decision-making criteria when considering treatment in the context of either damaged or missing teeth. Accurate diagnosis is essential, and the clinicians involved must always have the aesthetic aspects of the treatment foremost in mind when dealing with sites located within the appearance zone. DT

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Thriving on all-ceramics, Ivoclar Vivadent prepares for the future

Dental Tribune International recently visited the company's headquarters in Liechtenstein

DTI

SCHAAN, Liechtenstein: Walled off by the majestic elevations of the Rätikon mountain range and the Appenzell Alps, several industrial hydraulic mixers are continuously at work. Every now and then, a worker brings new barrels filled with raw materials that are turned into a new compound that forms the base for IPS e.max blocks from Ivoclar Vivadent.

Launched on dental markets for the first time seven years ago, the game-changing dental restorative system has earned Ivoclar Vivadent from the small European principality of Liechtenstein wide international acclaim as a provider of materials for highly aesthetic all-ceramic dental restorations. According to some industry sources, it has also defined the new gold standard in the field.

Comprising lithium disilicate glass-ceramic, zirconium oxide materials, and veneering ceramics for the press and CAD/CAM techniques, it has an impressive clinical track record and has won the company a number of acknowledgements, including a Celebration of Excellence Award for Outstanding Innovation in Cosmetic Dentistry at the recent annual meeting of the American Academy of Cosmetic Dentistry in Seattle in the U.S. in June.

With double-digit growth last year, the materials, whose composition remains a well-kept secret, have also become one of the company's most important drivers of economic success. Ivoclar Vivadent held an international expert symposium last year in Germany for the first time that was focused entirely on the system and the treatment results dentists are able to achieve with it in daily practice. According to Chief Sales Officer Josef Richter, the system still has much potential.

"With IPS e.max, it is fair to say that we started a revolution in the field of fixed prosthetics, as it provides a highly aesthetic and durable solution not only for single-tooth restorations but also for far more complex indications, like three-unit bridges," he recently told Dental Tribune Asia Pacific.

In addition to the high market acceptance of its poster child product, Richter said that his company performed above the market average last year with its entire portfolio, including removable prosthetics and filling materials. Sales of clinical equipment and luting cements like Multilink Automix and Variolink II increased by over 10 percent, he said, despite unfavourable conditions that make it more difficult for the company to operate in regions affected by the economic crisis, such as Southern Europe.

Josef Richter (left) and Christian Brutzer talking to Dental Tribune. (DTI/Photos Annemarie Fischer, Germany)

"Market reports from most of our offices show that fewer patients are currently visiting a dentist than potentially should, which is a matter of concern. As a result, we expect 2013 to be a difficult business year for the industry. However, expansion is still possible, if the market is growing slightly or at all," he predicted. "Driven by our core business and innovations, our goal is to come out higher than the market average next year."

Among the recent developments, Ivoclar Vivadent launched this year is Tetric EvoCeram Bulk Fill, a further development of its nano-hybrid composite line, which the company says was designed with a powerful initiator for use with the bulk-fill technique and for tooth restorations in the posterior regions that are difficult to reach. It also introduced BioUniversal KFG, a golden, high-expansion universal casting for milling and the telescopic crown technique suited to veneering low-melting special ceramics, for example. The IPS e.max CAD range has been expanded and now covers all possible indications, from light veneers to hybrid abutments and bridges with three or more units. To make it easier for customers to navigate their way through Ivoclar Vivadent's extensive product offering, the entire portfolio was redesigned into three main categories: direct restoratives, and fixed and removable prosthetics.

The company has invested heavily in its infrastructure recently, with €16 million reported to have been spent on a new building expanding its headquarters in Liechtenstein, which is intended to increase storage capacity and hosts high-end dental facilities where the latest developments are regularly put to the test under clinical conditions. Moreover, the manufacturing plants in nearby Bürs in Austria, where Ivoclar Vivadent produces dental equipment, such as its Bluephase curing light, and in Amherst near Buffalo in the US have been expanded too. New sales offices and subsidiaries are planned in Russia and Ukraine, among other countries, a step that will expand the company's already large reach in 120 countries.

"A few years back, we decided to specifically target emerging markets, which now helps us to compensate for moderate growth in established regions like Europe or North America," Global Region Head Asia/Pacific Christian Brutzer explained. "In India, for example, we have grown from only 10 people in 2009 to more than 80."

According to Brutzer, the emphasis on increased local presence has not only facilitated growth in most of these regions, but also dramatically changed the way the company is perceived there. Education according to its own standards is considered a key factor for long-term development, a concept that has found its way into customer relationships through the establishment of International Centres for Dental Education, which are intended to offer training to existing and future customers through lectures and practical courses. Currently, the company maintains 25 of these centres worldwide, with the largest one in Schaan itself, where training laboratories are occupied almost around the clock by dentists and technicians from all over the globe.

"All of our subsidiaries or sales offices currently provide some form of training. No other company in the market invests so much in education," Richter said.

"The increase in solutions available on the market has led to confusion among many customers of what is right for them," he continued. "Therefore, we want our customers to understand the fundamental advantages that come with buying a product from us. In this respect, we see an opportunity to provide them with confidence and peace of mind." DT

"No other company in the market invests so much in education."

Richter is confident his company can grow in 2013.

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Researchers investigate neurobehavioral effects of dental amalgam fillings

SEATTLE, USA: Researchers have discovered that common genetic variants of metallothionein (MT), a protein that has the capacity to bind heavy metals, increase susceptibility of children to mercury toxicity from dental amalgam and other sources. In a study of 330 children, they found that boys carrying the variants were more prone to neurobehavioral deficits associated with mercury.

The study included 164 boys and 166 girls aged 8 to 12 who participated in the Casa Pia Study of the Health Effects of Dental Amalgam in Children, a study investigating the health effects of low-level mercury exposure conducted between 1996 and 2006 among students of the Casa Pia school system in Lisbon, Portugal.

Scientists at the University of Washington evaluated whether MT1M and MT2A gene status, genes that have been reported to alter mercury toxicokinetics in adults, affected the relationship between urinary mercury concentration and neurobehavioral functions in children. They evaluated the urinary mercury levels and neurobehavioral performance of the children annually from baseline through seven years of follow-up after initial placement of dental amalgam or composite resin tooth fillings. Eighty-one boys and 74 girls received composite fillings, while 83 boys and 92 girls received amalgam fillings.

Among boys, numerous significant interaction effects between the genetic variants of MT1M and MT2A and mercury exposure were observed, spanning multiple domains of neurobehavioral function, the researchers said. Impaired performance was noticed primarily within the domains of visual spatial acuity and learning and memory, with some additional impacts on attention and motor function. However, all associations were restricted to boys with MT1M and MT2A variants in particular, although mercury exposure from dental amalgam was comparable among boys and girls.

The authors said that the findings may have important public health implications for future strategies aimed at protecting children and adolescents from the potential health risks associated with mercury exposure.

The study population had an average IQ score of 86 and relatively higher urinary mercury at baseline, implying higher pretrial mercury exposure. The researchers suspected that exposures associated with fossil fuel combustion for multiple uses within the local urban environment were possible sources of mercury. In addition, fish consumption, a source of inorganic mercury, could have contributed to elevated urinary mercury levels among the children. According to the researchers, Portugal has the highest fish consumption per capita in Europe. More than 60 percent of parents or caregivers of the children in the study reported that their children consumed fish on a weekly basis.

The study, titled "Modification of Neurobehavioral Effects of Mercury by Genetic Polymorphisms of Metallothionein in children," was published online on July 1 in the Neurotoxicology and Teratology journal. DT

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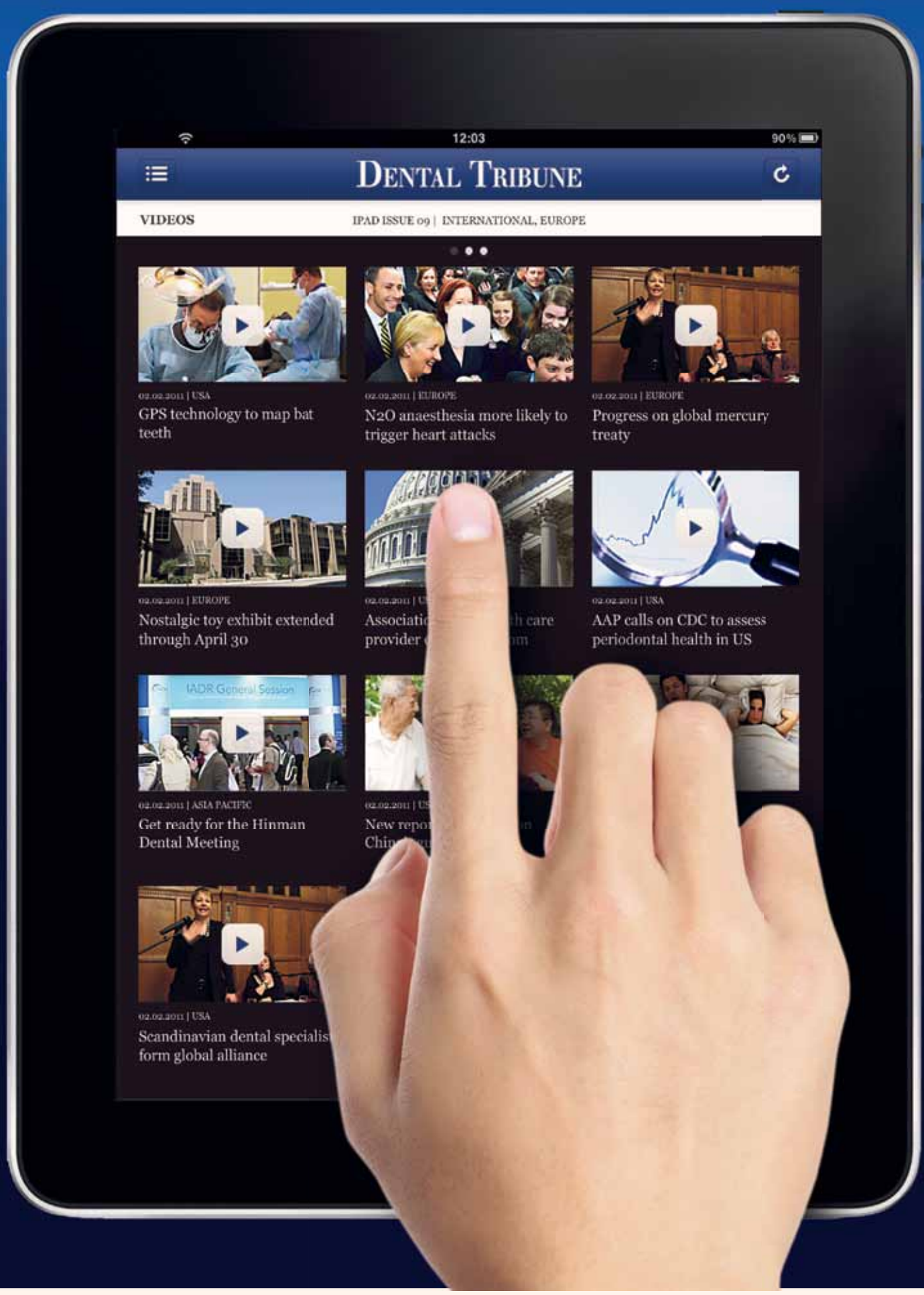

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