FDA investigates handheld dental X-ray devices

Daniel Zimmermann
DTI

SILVERSPRING, Md., USA: The Food and Drug Administration is advising dental professionals and veterinarians in the US to stay away from handheld X-ray devices that are being offered by online sellers and shipped from abroad. At least one of these devices was recently found not to comply with safety standards and therefore to be potentially hazardous for dentists and patients, the organisation said.

FDA officials told Dental Tribune Asia Pacific that they are currently monitoring handheld dental X-ray units throughout the United States. Information about the device in question were recently sent to the organisation by the Washington State Department of Health in Tumwater, Washington, which found during an inspection that a device purchased from a seller outside the country did not fulfil the FDA’s X-ray performance standards.

The organisation said to have notified state regulators as well as dental and other health organisations about the potential health risks. Dentists will be advised to verify whether the devices are using have the required labelling and to contact state officials in case they are unsure if their device is safe.

The organisation refused to disclose further information about the extend of the problem or when and where these devices could have entered the country. However, this newspaper found that several devices produced in Asia are directly offered via internet to customers in the West including those in North America.

FDA-approved devices are currently available from a dozen manufacturers including Sigma, Digimed or Aribex. It’s president and CEO Ken Kaufman welcomed the investigation while emphasising that these systems fall into that category.

FDA investigates handheld dental X-ray devices

North Korea
An interview on dental relief efforts

Orthodontics
Dental occlusion/TMJ and general body health

Tooth transplantations
Aesthetic reconstruction of premolars

FDA approved devices

Poor oral health among trekkers

German researchers have evaluated the mouth and tooth hygiene of trekkers in the Himalaya and discovered that their oral flora changes significantly while travelling. Among others, they found elevated levels of the bacteria typically responsible for dental infections, such as periodontalitis and gingivitis.

Their study also found that trekkers who had had a dental check-up within the previous six months were less likely to have dental problems and bleeding gums in particular. In addition, they determined that 16.5 per cent of the trekkers reported problems that could have been treated with a dental emergency kit. Although thousands of tourists go on trekking vacations every year, there is no information regarding the procedure to follow in case of dental emergencies or no systematic guidelines for prevention.

Rapist gets 40 years in prison

A judge in the Philippines has sentenced a 52-year-old man to a maximum of 40 years in prison and a P180,000 (US$4,200) fine for raping and robbing two female dentists in the capital Manila last May. The man is also facing charges for having committed sexual crimes against 23 other dentists.

Morita receives design awards

Morita has been awarded the renowned iF Design Gold Award for its Sofi dental treatment unit. The Japanese-based provider of dental equipment also received two Communication Design Awards for Sofi’s user interface and for the Sofi catalogue, advertising and printed media design.

Waiting times accumulate

People living in Morley, Western Australia, should better take their dental hygiene seriously. Latest statistics by the Government of Western Australia Department of Health have revealed that getting an appointment for a non-emergency dental procedure in the small suburb near the city of Perth can toll up to three years.

According to figures of the latest Western Australia Health Performance report, similar waiting times have recently been observed throughout the state ranging between one and a half and two years on average. Besides Morley, patients from Amadaile and Fremantle also had to wait 18 months for a dental appointment. Overall, more than 24,000 patients are waiting for treatment in public dental clinics.

Health officials said that the latest increase in dental appointments was due to rising awareness of people that are eligible for subsidised dental treatment including low-income families and pensioners. More than 400,000 people or one fifth of the population are currently estimated to fall into that category.

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Bad breath gas used to make liver cells from teeth

TOKYO, Japan: A team of Japanese researchers has demonstrated that hydrogen sulphide, one of the main causes of bad breath, could be a key component in developing future medical therapies. In a recent study conducted at the Nippon Dental University in Tokyo, they reported that stem cells isolated from dental pulp transformed into liver cells after being incubated with the characteristically foul smelling gas for at least three days.

While dental pulp stem cells have been found to have the ability to transform into a number of different cells, including muscle and blood cells, this is the first time that researchers have claimed to have cultured a large number of cells that were able to store glycogen and collect urea—the two main functions of the liver. They said that although more research might be needed on the possible carcinogenic effects of the method, results indicate that it produced cells with little potential to differentiate, hence limiting the risk of developing tumours after transplantation.

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“Hydrogen sulphide did not cause apoptotic changes in the cells,” they stated in the report.

Common methods of producing hepatic cells for human transplantation include the use of foetal liver tissue, which is heavily regulated worldwide. The researchers however extracted stem cells for their study from patients undergoing regular tooth extractions. These were then divided into two groups, of which one was incubated with hydrogen sulphide and the other with a different medium.

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Indian dental clinic chain aims for expansion

HYDERABAD, India: India’s rising dental health-care sector is expected to receive another significant investment, as Alliance Dental Care has announced that it will triple its number of dental clinics by mid-2015. The expansion is intended to serve different market segments, including dental spas, regular dental clinics, as well as express cleaning and whitening spots located in public places like airports and shopping malls.

Alliance Dental Care was founded in 2002 as a subsidiary of Alliance Mediroc, a joint venture between Apollo Hospitals and medical equipment provider Trivitron. Both companies have been reported to seek private investors in order to raise Rs 0.5 trillion (US$10 billion) for the first phase of the expansion in 2012. The new clinics, as well as the existing ones, have been re-branded as White Dental Clinics, they said.

Alliance Dental Care currently maintains over 20 dental clinics in major Indian cities like Chennai, Bangalore and Hyderabad. In addition to its Indian business, the joint venture is also eyeing potential markets overseas, including South-East and West Asia, Africa and Eastern Europe.

According to the latest financial reports, Apollo boasted revenues of Rs 25 trillion (US$460.4 million) in 2010/2011. Once the expansion has been completed, the company will hold a 70 per cent share in Alliance Dental Care.

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DENTAL TRIBUNE Asia Pacific Edition

Asian News 3

Dutch supplier acquired by SomnoMed

Daniel Zimmermann

SYDNEY, Australia/ZURICH, Switzerland: SomnoMed has expanded its own distribution network in Europe through a new acquisition. According to the terms of an agreement closed between the Australian-based company and Goedegebuure-Zaapietertechnik R.V. (GS) in Lourenen aan de Velde near Amsterdam, GS will market and distribute SomnoMed’s range of dental solutions for the treatment of sleep breathing disorders exclusively in the Netherlands.

The SomnoDent MSA device has seen increasing sales in the Netherlands. (DENT/Photo SomnoMed, Switzerland)

Currently, GS is one of the leading Dutch suppliers of mandibular repositioning appliances. With the take-over, SomnoMed intends to boost its presence and business development in Europe, particularly in important Central European markets, CEO Ralf Barschow said. He told Dental Tribune Asia Pacific that sales have jumped-started in the Netherlands because devices for the treatment of conditions like obstructive sleep apnoea syndrome have been reimbursed by the country’s health insurance companies since 2010.

The acquisition will be paid half in cash and half in shares and is expected to be completed by 2013. SomnoMed stocks listed on the Australian Securities Exchange reacted positively to the announcement.

According to Barschow, sales in Europe contribute approximately 25 per cent to SomnoMed’s global business results. Last year, revenues in the region grew by over 50 per cent.

He confirmed that the company is also in talks with other suppliers in Europe. Since 2008, the company has been operating actively in Europe through its subsidiary in Zurich in Switzerland.

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Dear reader,

When I got the chance to interview Dr Melvin Cheatham for this edition’s article on dentistry in North Korea (page 9), I was impressed with the voluntary work his charity organisation, Samaritan’s Purse, has done and is currently doing in many underprivileged parts of the world.

It remains a sad and not widely known fact that in the DPRK and many other countries in Asia, public health-care systems are heavily dependent on help from outside organisations in order to provide even the most basic level of medical or dental care. Moreover, their assistance has become increasingly essential during widespread emergency situations like natural disasters, which most of these systems, I think we can agree, are not able to handle adequately.

During my work for this newspaper, I have found that dentists are generally very open to using their professional skills for the greater good, for example, by forming part of a temporary dental relief workforce. Without their enthusiasm and willingness to spend a significant amount of their time in far-off places, there would be fewer smiles in the world today.

Yours sincerely,
Daniel Zimmermann
Group Editor
Dental Tribune International

Not all hand-helds are created equal

There are two sources of radiation from X-ray systems: leakage radiation from the X-ray tube and scattered radiation from the patient. The leakage radiation is minimised by placing highly absorbing material, such as lead, around the X-ray tube. The major issue with the hand-held X-ray units is the scattered radiation, that is X-rays that are scattered from the patient towards the operator. In fact, about 20 to 30 % of the X-rays are scattered from the patient towards the person holding the device.

The X-ray units from outside the USA, which are under FDA scrutiny, do not provide any protection from X-rays scattered from the patient. These systems look like a large camera that you hold with both hands. There is no shielding provided by these hand-held systems, that is the user’s hands are exposed to all of the X-rays scattered from the patient. Consequently, the user’s hands are going to receive a radiation dose that will probably exceed the radiation protection limits for skin and extremities. Therefore, these units should not be hand-held.

We evaluated one hand-held X-ray unit manufactured in the USA (Nomad, Arthrex Inc.) and compared staff doses with those for the same staff using conventional wall-mounted systems prior to acquiring the hand-held systems (Gray et al. 2012). This hand-held system uses a proprietary shielding material around the X-ray tube, resulting in leakage radiation levels that are virtually immeasurable. In addition, it has an integral leaded-acrylic shield that protects the user from radiation scattered from the patient. The results of our study indicated that the users of the hand-held X-ray system received lower radiation doses than they did when they were using conventional wall-mounted systems.

Buyers should be beware that not all hand-held X-ray systems are created equal and not all of those being sold on the web have been reviewed by the FDA. Hand-held X-ray units should have sufficient shielding to minimise leakage radiation and an integral shield to protect from radiation scattered from the patient.

Contact Info
Dr Joel Gray
USA
joelgray@diquad.com

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Decaying health care

Relief efforts are laudable as it goes some way towards helping the North Korean government ensure that it meets its obligations to respect, protect and fulfill the right to health of its citizens.

In its report, “The Crumbling State of Health Care in North Korea”, (ASA 24/003/2010), Amnesty International documented the devastating impact of long-term food insecurity on the population’s health and concluded that the North Korean state bears the responsibility for the country’s decaying health care infrastructure, failure to provide basic health care, and a lack of public health education and information. Food shortages and a more general economic crisis persist to this day, Health facilities are rundown and operate with frequent power cuts and no heat. Medical personnel often do not receive salaries, and many hospitals function without medicines and other essentials.

To this end, Amnesty International has urged the North Korean authorities and its new leader Kim Jong-un to address severe shortages in the healthcare system including through accepting international humanitarian assistance and for providing full cooperation and access (in efforts by organizations like Samaritan Purse) to ensure that care reaches those most in need.

Contact Info
Rajiv Narayan
USA
rnarayan@amnesty.org

Amnesty International in London.
Intraoral device manoeuvres wheelchair

ATLANTA, Ga., USA: Researchers at the Georgia Institute of Technology have developed the latest version of the intraoral Tongue Drive System, which is embedded into a dental retainer and is worn inside the mouth. The system, which only requires free movement of the tongue, allows people with high-level spinal cord injury to control a powered wheelchair.

The user receives a clinical tongue piercing, with which he can control the magnetic field sensors mounted on the device’s four corners. The sensors track the relative location of the magnetic piercing and transmit the data wirelessly to an iPad or iPhone. Software installed on this computer device interprets the user’s tongue position and moves the wheelchair accordingly.

In earlier versions, the sensors were attached to an externally worn headset. “One of the problems we encountered with this earlier version was that it could shift on a user’s head and would need to be recalibrated,” said Maysam Ghovanloo, associate professor at the institute. The new device sits tightly against the roof of the mouth because it is moulded from dental impressions. As it is worn inside the mouth, it is protected against such disturbances and is less conspicuous.

The new device includes a lithium-ion battery and an induction coil to charge the battery. It is covered with an insulating, water-resistant material and vacuum moulded inside standard dental acrylic.

The researchers also created a multifunctional interface, which holds the iPad, receives and delivers the sensor data, charges the iPad and is fitted with a holder for charging the dental retainer at night. The system can be hooked up to any standard electric wheelchair.

Ghovanloo and his team plan to begin testing the usability of the system by able-bodied individuals soon and then move onto clinical trials.

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DENTAL TRIBUNE Asia Pacific Edition

World News

Dentists patent novel soft-tissue augmentation technique

Daniel Zimmermann

ALEXANDRIA, Va., USA: An invention from Saudi Arabia that could help more patients to get dental implants is reported to have been granted patent status by the US Patent and Trademark Office. The new method, called the tunnelling technique, is claimed to increase the thickness of soft tissue prior to block grafting procedures using an acellular dermal matrix.

Developed by implant specialist Dr Ali Thafeed AlGhamdi, who is also head of the Periodontic Division at King Abdulaziz University’s Faculty of Dentistry in Jeddah in Saudi Arabia, the technique was first filed for patent application in February last year by a Virginia law firm.

In the application, the researchers explain how to position an acellular dermal matrix over the recipient site and fix it corporally via a tunnel that is formed by making two incisions through the mu cosa. Using this method, the researchers detected an increase of 1 to 2 mm in soft-tissue thickness following allografts.

The acellular dermal matrix has been successfully applied in many surgical fields, including cosmetic procedures and regenerative medicine. It has been on the market since the early 1990s. Al-Ghamdi told the Saudi Press Agency in Riyadh that he started looking into the technique when he noticed rapid healing in dental implant patients who had been treated with allografts for soft-tissue augmentation prior to symphysial block grafts. He said that his invention could contribute significantly to the improvement of block graft surgery in diseased jaws.

According to the latest research, thin soft-tissue biotypes affect implant success significantly by failing to maintain the required crestal bone level.
3Shape releases Dental System 2012

COPENHAGEN, Denmark: 3Shape, a Danish company specialising in 3-D scanners and CAD/CAM software solutions, has released its next-generation Dental System 2012 to the market. For the first time, it offers different scanner models and Standard or Premium software versions in order to provide a flexible and scalable solution that can be matched to labs of any size or business model with upgrade possibilities for future requirements. 3Shape offers a wide range of new digital workflows and communication tools designed to help labs expand their range of services to dentists. 3Shape’s Dental System 2012 introduces a variety of scanner/software combinations so that labs, regardless of their size or business model, can find suitable CAD/CAM tools to match their business needs and ambitions. 3Shape recently declared its new mission, “Helping labs to help their dentists.”

“In today’s competitive climate, labs that shift from production-only to service-provider profiles are winning market share. With Dental System 2012, 3Shape is bringing labs solutions designed to help them build new services and stronger business relationships with their dentists,” stated Tais Clausen, CTO of 3Shape.

The new Dental System 2012 features 3Shape Communicate, which enables labs to send their dentist-clients 3-D design visualisations for use in their discussions with the lab and with their patients; ModelBuilder, which allows technicians to design lab models, including implant models, for an extensive range of indications directly from intra-oral scans and conventional impression scans; TRIOS integration, which enables labs to receive TRIOS digital impression scans from the clinic directly to their Dental System inbox; Texture Scanning, which enhances visualisation of surface details and allows technicians to incorporate hand-drawn design guidance markings into the digital design (texture scanning is available on D800/810 scanners); and Dynamic Virtual Articulator, which offers support for the market’s most widely recognised articulators, providing the optimal user experience. In addition, with Occlusion Compass functionality, the colours of contact points are mapped to specific occlusal movements.

Furthermore, the Dental System 2012 features Temporaries and Diagnostic Wax-ups, a revolutionary workflow solution for producing temporary crowns and diagnostic wax-ups (including Virtual Prep, Virtual Gingiva, CAD Temporaries and Virtual Diagnostic Wax-up design); Multilayer Design, which enables highly productive bridge design for pressing or combinations of milled glass ceramics and zirconia, and automatically splits full anatomy designs into two true and entire parts, without undercuts or lost areas; the Improved SmileComposer, which enables optimised auto-placement of crowns and morphing to preparation; as well as Advanced Telescope design, new software for optimised creation of telescopic crowns, including sophisticated primary telescopic moulding and improved edge design.

3Shape has also introduced a new scanner: the new D500 model and impression scanner, which was developed based on 3Shape’s advanced scanning technologies for full and accurate capture. The D500 was designed specifically to meet the needs of labs seeking to enter CAD/CAM manufacturing equipped with the latest and best technologies. Additionally, 3Shape offers 5.0 MP D700 and D800 scanners with extensive indications and texture-scanning capabilities for medium to large labs.

According to 3Shape, its solutions are timeless because the company ever strives for innovation and continues to provide major feature-packed upgrades for its users every year. 3Shape backs its Dental System users with an extensive support network and comprehensive training package.
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**“Units are considered a national treasure by the North Koreans”**

An interview with Samaritan’s Purse’s Dr Melvin Cheatham, USA

Through its World Medical Mission programme, the US-based Christian charity Samaritan’s Purse provides health care by means of medical and dental volunteers in developing countries around the world. It is also one of few organisations that maintain relations with the Democratic People’s Republic of Korea, also known as North Korea.

DTI’s Group Editor Daniel Zimmermann spoke with Dr Melvin Cheatham, member of the advisory board, about the organisation’s projects there and the state of dental care in the communist state.

Daniel Zimmermann: Dr Cheatham, like many things that concern the Democratic People’s Republic of Korea, very little is officially known about the dental infrastructure there. How would you describe the level of dentistry in the country?

Dr Cheatham: Although I have been to the DPRK more than 20 times and met with people at the highest level, it is very difficult to identify the current depth and availability of dental care and education. Obviously, dentistry there is performed on a much lower level than in Germany, the US or in any other country in the developed world. If you also look to another developing countries as an example, there is reason to believe that dental care is being provided by people who do not have the level of education which is normally required to perform dentistry.

Your organisation, led by Reverend Franklin Graham, is supporting the country through a number of dental care-related projects. When did these start?

The relationship between the Graham family and the DPRK dates back to the 1950s when Franklin Graham’s mother Ruth Belle Graham, who was born in China, attended a missionary school in Pyongyang, which was then under Japanese occupation. Wanting to go there himself, her husband Billy Graham, a world renowned religious leader and founder of the Billy Graham Evangelistic Association, first met with the DPRK’s leader Kim Il-sung before his passing in 1994.

During this visit, the organisation equipped the first mobile dental vehicle, which was intended to provide dental care to those people who weren’t able to get it, for example, in North Korea’s countryside. A second mobile dental unit was equipped years later by Samaritan’s Purse, led by Billy Graham’s son Franklin at the request of the DPRK. Both units are considered a national treasure by the North Koreans, as they were given to them with the blessings of their beloved leader.

Are these units still operational today?

Although these services are still operational, the focus has lately shifted towards developing permanent dental care in the capital. A few years ago, the DPRK’s Ministry of Public Health asked Samaritan’s Purse for assistance in equipping a dental centre in Pyongyang that would not only serve as a place where dental care was given but also where dentists could obtain continuing education on the newest dental procedures and techniques with the goal of improving oral health care throughout the country.

This centre is now well equipped with six complete operatories, teaching facilities and materials as well as laboratory equipment to manufacture dentures and crowns.

What is the relationship with your Korean partners like?

I think they appreciate both the supplies and teaching opportunities very much. The needs for dental care are substantial in that country, which is supported by the fact that the Ministry of Public Health asked for assistance in that area. Similar to dental communities in most countries around the world, there is obviously great interest in learning, for example, on how to perform more sophisticated procedures like dental implants. From my point of view, it has always been warm and friendly relationship.

Samaritan’s Purse works closely with officials and with dentists and other professionals in the DPRK in order to be able to identify and understand the opportunities for development in that country and to be able to appropriately respond through providing training, supplies and equipment. All work in the DPRK is done in a spirit of friendship, and aimed toward building further upon the special relationship that has been established through Samarian’s Purse with government and with medical and dental care officials.

You are also conducting projects in other developing countries. How is working in the DPRK different from those?

Owing to the fact that the DPRK is almost a closed country, one always has to gain permission for a delegation to visit far ahead of time. The visits themselves are also limited to several days or just one or two weeks, so staying for a longer period of time is not possible.

Have you noticed any change in light of the recent death of Kim Jong-il and the passing of power to his son Kim Jong-un?

With the 100th birthday of Kim Il-sung coming up in April, this is a very important time for the country. A lot is going on and whether there will be political changes owing to the recent passing of Kim Jong-il has to be seen. From the standpoint of communication that we have on behalf of our president with the DPRK’s leadership and those involved in the work that is being done, I expect it to remain very productive.

Dr Cheatham, thank you for this interview.

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Image: Dr Melvin Cheatham unpacking dental supplies during a visit to the DPRK.
Clinical evidence and mechanism of an underestimated relationship between the TMJ and the general body health

**Title:** Dental occlusion/temporomandibular joint and general body health

**Authors:** Dongsun Jeong, Kyungjae Oh, Ji Seong Kwon, Young-Jae Moon, Hyung-Joo Moon

**Journal:** Dental Tribune Asia Pacific Edition

**Abstract:**

The relationship between the TMJ and the general body health remains controversial. This article reviews the various studies on the relationship between dental occlusion/TMJ and general body health. Among other findings, it has been found that lesions in the masticatory muscles or dento-alveolar ligaments can perturb visual stability. The functional coupling of the stomatognathic system with the neck region is well known. Patients suffering from occlusal or TMJ disorders have frequently reported dysfunction and pain in their neck muscles. An imbalance of sternocleidomastoid muscle activity, often leading to neck pain, can be induced by a unilateral loss of occlusal support.

**Mechanism of relationship:**

The biomechanical impact on cervical vertebrae during occlusion has been calculated, which confirmed that vertical occlusal alteration can influence stress distribution in the cervical column. Possible associations between trunk and cervical asymmetry and facial symmetry have been reported. For example, it has been found that visual perception control is most important in orienting the head in the frontal plane. A relationship between dental occlusion and postural control has also been postulated. Fluctuation in the centre of gravity caused by altering the occlusal contact area experimentally was examined, and the results confirmed that occlusal contact affects gravity fluctuation and that appropriate occlusion attained by maintaining even occlusal contact in the posterior region is crucial for gravity fluctuation.

**Mechanism based on qi and the meridian aspect:**

Traditionally, acupuncture meridians are believed to form a network throughout the body, connecting peripheral tissues to each other. Studies that further elucidate the acupuncture point/meridian systems from a Western perspective have mainly focused on identifying distinct histological features that differentiate acupuncture points from surrounding tissue. One of the histological and anatomical associations with the meridians is intermuscular or intramuscular loose connective tissue (fascia). Ancient acupuncture texts contain several references to “fat, greasy membranes, fasciae and systems of connecting membranes” through which...
the qi is believed to flow. In terms of connective tissue associations, several authors have suggested that a connection may exist between the acupuncture meridians, which tend to be located along the fascial planes between muscles or between a muscle and bone or tendon, and the connective tissue. In view of experimental evidence, it has been hypothesised that the network of the meridians can be viewed as a representation of a network of interstitial connective tissues. These findings are supported by ultrasound images showing connective tissue cleavage planes at the acupuncture points in human beings. Rather than viewing acupuncture points as discrete entities, it has been proposed that these points might correspond to sites of convergence in a network of connective tissue permeating the entire body, similar to highway intersections in a network of primary and secondary roads. 

Correlation between trigger points and acupuncture points

Although separated by two millennia, the traditions of acupuncture and myofascial pain therapies share fundamental similarities in the treatment of pain disorders. Recent reports have suggested substantial anatomic, clinical and physiological overlap of the myofascial trigger points and acupuncture points. The analogy between the trigger points and acupuncture points has been discussed since 1977 when 100 % anatomic and 71 % clinical pain correspondences for the myofascial trigger points and acupuncture points in the treatment of pain disorders were reported.

A number of similarities between them were also suggested. The two structures have similar locations and needles are used at either point to treat pain. The pain associated with the local twitch response at trigger points is similar to the de qi sensation, and the referred pain generated by needling trigger points is similar to the propagated sensation along the meridians.

It was pointed out, however, that the acupuncture points located at the trigger points are not frequently used by acupuncturists, and do not share the same clinical indications as the trigger point therapy. It was further argued that the claim of 71 % correspondence between the acupuncture points and the trigger points is conceptually impossible.

Furthermore, even putting this conceptual problem aside, no more than 40 % of the acupuncture points correlated with the treatment for pain and, more likely, only approximately 18 to 19 % of the points are actually correlated. The correlation between the trigger points and the acupuncture points clearly need to be further investigated in the future.

The fascial connection theory we propose can explain the functional connection between dental occlusion/TMJ and other parts of the body based on either myofascial release or the qi and meridian system, or a combination of the two. Therefore, dental occlusion should be built up and maintained in a normal natural condition, while causes for deterioration of the TMJ status should be treated in an effort to restore the natural condition.
Aesthetic reconstruction of a transplanted premolar tooth

Several therapeutic approaches are available for restoring missing anterior teeth. The most commonly used involve the placement of implants or the fabrication of resin bonded bridges. Another option is tooth transplantation.

In this article, an alternative approach will be presented to provide a suitable restorative solution for a young female patient who had lost an anterior tooth by using a rather unconventional concept.

Restoring upper anterior teeth has proven to be a challenging task for the dental team. Criteria such as aesthetics, function and strength have to be individually assessed in each case. Owing to the advancements in the field of dental materials, however, dental teams nowadays have many all-ceramic restorative options at hand, ranging from zirconium oxide-based framework materials to press ceramics and layer ceramics for individualised layering on refractory dies. The selection of materials for the fabrication of dental restorations is immense.

The lithium disilicate-based IPS e.max Press ceramic (Ivoclar Vivadent) has proven to be an ideal material for those cases in which single-tooth restorations with demanding aesthetics are required. With this material, the wax model can be reproduced precisely with the ceramic material. The fully anatomical restoration is characterised with stains and then fired. A more exacting option would be the cut-back technique, in which Impulse and Inlay materials (IPS e.max Ceram range, Ivoclar Vivadent) are applied to the occlusal and incisal areas of the pressed framework. By applying small amounts of layering material, highly aesthetic restorations can be achieved in just a few steps.

The same principle applies to the fabrication of ceramic veneers. Based on a wax model, partially or fully anatomical restorations are pressed with ceramic and subsequently characterised by means of stains and layering materials. The individual build-up of the veneers with layering materials from the IPS e.max Ceram range on refractory dies is a more time-consuming and demanding option. However, the outcome makes the effort worthwhile.

The patient discussed here lost tooth #11 (FDI) owing to an endodontic complication. When this tooth was extracted, tooth #15 was transplanted into the space left by tooth #11 and the gap was preserved by means of orthodontics (Fig. 1). Following successful healing, the 32-year-old expressed her wish to have the transplanted tooth modified for obtaining an impeccable ceramic appearance. We relied on preoperative models to visualise the case and discussed the various options on the basis of a wax-up. As shown in Figure 2, the transplanted premolar had a strong vestibular inclination as a result of its specific anatomy. This was a factor that made the goal of achieving a harmonious outcome more complicated. When the preoperative model was evaluated, the orthodontically modified gap was identified to be somewhat too large in relation to the width of tooth #21. The immediate solution considered by the restorative team was to build up the incisal aspect of tooth #12 with the help of composite in order to restore the harmonious relationship between the central incisors.

Unfortunately, this procedure would have caused the lateral incisors to be disharmonious. Another criterion was the length/width ratio of the anterior teeth (odontometрический). In order to achieve a harmonious appearance that matched the age of the patient, the incisal areas of the anterior teeth would have had to be lengthened by 1 to 1.5 mm. These aspects were discussed with the patient and visualised with the help of various models and the wax-up. A treatment goal was agreed upon with the patient, and it was decided that one crown (tooth #11) and three veneers (teeth #12, #22, and #21) were required. The wax-up was optimised accordingly and an aesthetically pleasing outcome was created (Figs. 3 & 4). In order to provide a better preview of the restoration, the final wax-up was transferred to a mock-up by means of a template. The patient was thus able to gain a more detailed idea of the planned outcome before treatment commenced (Fig. 5). She agreed to have the final restorations fabricated on the basis of this mock-up.

When a restoration has to be made in a largely healthy masticatory system, the outcome is more complicated. When the dies are fabricated with utmost precision and undercuts have to be prevented at all costs. For an optimal fit of the dies on the model, parallel surfaces that do not allow for any torsion movement of the dies were created. A guidance groove was therefore not necessary (Fig. 7). If the work is carried out precisely, this method allows a high accuracy of fit to be achieved. After the glaze firing, the completed restorations showed an accurate fit in the vertical dimension almost too small from the beginning.

The information gathered in the previously completed wax-up was transferred to the working model through a silicone template, which was additionally adjusted to the situation. Then, another silicone template was prepared, which served as a reference for the subsequent ceramic layering.

Depending on the material used, the refractory dies are left to dry without additional heat for one day after fabrication. If required, they may be degassed. It is important that the dies are already removed from the silicone matrix after a setting time of 45 minutes, as
the material may start to dissolve the silicone. Subsequently, the preparation margin of the veneers is marked on the dies with a refractory pencil and wash firing is conducted (Fig. 9).

Thin application of material ensures that the ceramic layer is even and homogeneous, which is important for the fit of the veneers. A clear, transparent material for wash firing, like the IPS e.max Ceram Transpa clear or IPS e.max Ceram Add-On Incisal, was used. In order to keep the shrinkage as low as or as constant as possible during the main firing cycle, it is possible to create an isthmus with ceramic material. In this case, this structure was created in the cervical area (Fig. 9).

Layers of even thickness were then applied. Starting in the cervical area, dentine materials were used first. The incisal portion was created in accordance with the patient’s situation and supplemented with the appropriate incisal and Transpa materials (Fig. 10). This procedure was used to create individual characteristics (for example mamelons, opalescent areas) against a translucent background. The intensity of the materials could be controlled precisely while not being hampered by the opaque effect that is sometimes caused by an underlying layer of dentine material.

The crown on tooth #11 was fabricated using the cut-back technique. The IPS e.max Press lithium disilicate framework required that the crown be fabricated at the same time as the veneers. Subsequently, the incisal third of the framework was individually layered with IPS e.max Ceram veneering materials. With this procedure, optimum integration of the restoration into the surrounding tooth structure was achieved, as well as a shade effect that was identical to that of the veneers.

After the dentine firing process, in which the shade was adjusted, the crown and the veneers were fitted on the model. The proximal contacts were designed, and the shape and surface structure of the restorations were created according to the situation using silver powder (Figs. 11-13). With the final glaze firing, the ceramic layering was completed. The investment material was removed using 50-µ glass polishing beads at a pressure of 0.5 bar or 7.25 psi (Fig. 14).

A water-soluble gel that burns out without leaving residue was used to secure the sand-blasted restorations in place on the model. This method allowed us to check...
the lateral, protrusive movements, as well as adjust the restorations with rubber instruments. Taking the functional aspects already incorporated into the wax-up into account, the canines were built-up with composite material. A canine-based dynamic occlusion that relieved the anterior restorations was thus ensured.

Prior to being seated, the veneers were etched with hydrofluoric acid, which was carefully rinsed off after 20 seconds. The restorations were then silanised and seated according accurately to the established protocol for adhesive cementation. At the recall appointment after seven days, the teeth were rehydrated, and the soft tissue had recovered from the intervention (Figs. 15 & 16).

Conclusion
The case described in this article demonstrates that complex treatment concepts can be systematically implemented by the dental team with the help of detailed planning. Owing to the intensive counselling of the patient and treatment planning by means of the transfer of the mock-up to the patient’s mouth, a high quality, aesthetically satisfactory outcome was achieved.

Contact Info
Prof. Daniel Edelhoff is working as tenured associate professor at the Polyclinic of Prosthodontics, Ludwig-Maximilians-University, Munich, Germany. He can be contacted at daniel.edelhoff@med.uni-muenchen.de.

Björn Maier is a Master Dental Technician at the Polyclinic of Prosthodontics, Ludwig-Maximilians-University. He can be contacted at info@bjoern-maier.com.

Dr. Hela Ihloff is Academic Director of the Polyclinic of Orthodontics, Ludwig-Maximilians-University. She can be contacted at hela.ihloff@med.uni-muenchen.de.
During the 2011 conference of the Association Dentaire Française (ADF) in Paris, Gilles Pierson, CEO of the Acteon Group, gave insight into his company’s history, new products and future strategies.

Your business units Satelec, Pierre Rolland and Sopro were unified under the Acteon Group in 2001, followed by your Italian business unit, De Götzen, which joined the group in 2004. At IDS Cologne 2011, you introduced your new corporate identity and the new Acteon logo. What was the main reason for this re-branding?

The change in the group’s name is due to the fact that at the very beginning in 1990, Satelec existed on its own. Pierre Rolland merged with Satelec in 1995 to become Satelec-Pierre Rolland. After 1995, we decided to grow the company through acquisitions, so we acquired different companies like Sopro and De Götzen.

It would not have been feasible to have named the group Satelec, Pierre Rolland and Sopro, De Götzen and so on. We saw the necessity for a group name while maintaining the companies’ individual names. So the group is now named Acteon but the different companies that we acquired and that merged are identified as companies with their own history and their own products. This is also good for the employees, who feel they belong to the original companies while belonging to a large group.

So we have kept the history of each company, but we have grouped them under the umbrella of Acteon. Satelec is still known in countries like France, Pierre Rolland, which is a 60-year-old company, is still famous, so it’s a little bit difficult to introduce the name of Acteon. Eight years on, awareness is growing, although the individual companies’ names of Pierre Rolland and Satelec are, however, better known than the umbrella group of Acteon.

In countries where our history is shorter, like the USA, Asia or Australia, Acteon is now known as a company, and the different companies like Satelec, Pierre Rolland and Sopro as division. We want to keep the identity of each company in the group, while building a brand name that encompasses all of them.

With a turnover of €113 million and a growth rate of 16% in 2010, last year was a tremendous success for the Acteon Group. Over two thirds of sales occurred in the USA. 2011 was for you, and which markets do you consider most important for the group?

The year 2010 was another big and successful year with a 16% increase. In 2011, we expect another 9% increase in sales, which is good if you consider the economic situation. Europe will account for a stable 2% and the US for 10%. But the highest growth we are experiencing is in China, at approximately 20%. In general, Asia currently accounts for 20% of our global sales, so we achieve a 20% increase, we will be very satisfied. Countries like India in particular are very strong markets for us, as was Thailand until November, before floods plagued the country.

2011 and the coming years will definitely be driven by Asia, and especially by China, where we have been doing business since 1987. We now have a team of 40 people there and expect an average growth of 30% over the next five years. China is definitely a booming market.

When we talk to other European companies that sell on the Chinese market, they mention price sensitivity and the need to adapt to the local price level.

No, I don’t think it’s a question of price—it’s a question of mentality in China. They have cheap copies of all our products there. Twenty years ago, we used the copies. However, we realised that this was not productive because if the company simply closes and re-opens in the next garage, you are fighting a lost cause. More importantly, we realised that the Chinese copies are our best advertising because the quality is crap, and the design is just ridiculous. Dentists first buy a Chinese copy but then they experience some problems. As long as they have the money to buy a European product at a European price, they will have it. The fake Rollix made in China is sold in Europe, but the real Rollix made in Switzerland is sold in China. And the proper business-oriented Chinese clinic with a long-term plan will never buy a fake product.

On the other hand, we are seeing an alarming trend reverse in Europe. There are so many fake or copy products from China imported into Europe with a fake CE number or with a fake ISO 9009. The customs duties in the Shenzhen area do not block these fake products, so any kind of product can enter into Europe. These are healthcare devices to treat patients and they should not put patients in danger.

Do you believe that you will still be able to manufacture in France or in Europe in the future?

Acteon’s policy is to manufacture and conduct research in Western Europe, and not to manufacture in China, South-East Asia, Brazil, India, or anywhere else. Our policy is to produce continuously in Western Europe. Our factories are in France, Italy and Germany. Acteon has established itself in a niche of the health-care market where we are able to offer more or less the complete range of products. Only the panoramic machines and the Orthopantomography, which is also specialised in the ENT area. You see, there are many bridges between the dental and medical fields, between endoscopy in the medical and imaging in the dental field, between radiology in the dental and imaging in hospitals or ENT.

We are pleased with the cone-beam technology. These figures are within our expectations.

You are Platinum sponsor of the upcoming Europerio Congress in Fenners. What can visitors expect from Acteon there?

Basically, we are very involved in preventive and conservative dentistry. Periodontics has always played a major role in these areas and Europerio is considered to be the leading congress in this specialty worldwide. We have purposefully chosen to become Platinum sponsor of the congress because of the quality of its scientific programme and the involvement of the congress in the dental community.

Acteon will stage sponsored sessions on Wednesday, 6 June, from 10.00 to 17.00 (this includes a session hosted by Professor Cameron entitled “A new gingival retrac- tion technique for implants”). On Friday, 8 June, from 12.15 to 15.45, there will be a novel procedure for evaluating plaque sta- tus and soft-tissue inflammation using an intrasial camera. These sessions will be of interest to den- tal hygienists, general dentists as well as periodontists. The crème de la crème of international speakers will reveal tips and tricks from their professional lives, and we invite everyone con- dorially to join us in Vienna.
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Asentajärvenkatu 6, 00880 Helsinki, Finland
tel. +358 20 7795 500, fax +358 20 7795 555
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