To be held for the first time in South-East Asia, the seventh CAD/CAM & Computerized Dentistry International Conference in Singapore in October will offer a detailed overview of the latest CAD/CAM technologies that are aimed at helping dentists achieve aesthetic and long-lasting all-ceramic restorations chairside. During a presentation in Cape Town, South Africa, Dental Tribune Asia Pacific had the opportunity to speak with Ivoclar Vivadent’s Dr Michael Dieter, head of the International Center for Dental Education, who will be hosting the lecture theatre together with Jörg Vogt, international CEREC trainer for Sirona.

Dental Tribune Asia Pacific: Dr Dieter, your joint presentation with Mr Vogt in Singapore will be held in form of a lecture theatre. What is behind this concept?

Dr Michael Dieter: Jörg Vogt and I developed this concept two years ago. When the organiser’s managing director, Dr Dobrina Mollova, saw our performance at the sixth CAD/CAM & Computerized Dentistry International Conference in Dubai last year, she named it a “lecture theatre” because of its truly interactive nature. Jörg and I present in continuous dialogue with each other, which makes the lecture more interesting, not only for the audience but also for us. Additionally, case demonstrations with the CEREC AC will be performed live on stage.

Primarily, our lecture is aimed at dentists who are interested in minimally invasive aesthetic treatment solutions or who simply want to get into dental CAD/CAM technology. Our goal is to provide a guideline clinical treatment sequence for predictable treatment using chairside CAD/CAM technology. However, the lecture is also suitable for any dentist who is interested in all-ceramics as a modern restorative treatment option.

From my experience, I can say that many practitioners still have little knowledge of what all-ceramic material they are supposed to use for various clinical situations. With our lecture theatre, we aim to demonstrate the main differences in terms of aesthetics, particularly for use in the anterior dentition, and the physical properties or strength of the various cements in clinical reality? This is exactly what we will be discussing in our lecture: translucency, opalescence and fluorescence—these optical properties of the natural tooth can be reproduced in the patient’s mouth with select modern all-ceramic materials.

While I will focus on the treatment sequence from a clinical perspective, Mr Vogt will provide insights into the CAD/CAM process using the CEREC AC and the latest software (version 4.03). He will demonstrate live, step-by-step, how to design the restorations and I will illustrate the related clinical cases.

What are the most common mistakes when choosing materials?

Selecting the right material is not the only difficulty. The correct tooth-preparation technique remains a challenge for many dentists because all-ceramics require an entirely different preparation design compared with the conventional all-ceramic systems.

What do you think the reason is for this lack of knowledge?

Recently, we have seen the rapid development of materials and technologies. For the practitioner, it is sometimes difficult to keep up with all these new developments. This is why continuous education is becoming more and more important.

If we look at the increasing number of all-ceramic systems on the market that manufacturers claim to be aesthetic, we can in fact perceive significant differences. The question remains: what does “aesthetic” mean, and how suitable are these materials commonly used metal alloys or metal ceramics. If mistakes are made at the beginning, fracture of the restoration becomes much more likely. Therefore, preparation techniques for all-ceramics with regard to CAD/CAM application will be in focus as well.

What impact has CAD/CAM technology had on the usage of aesthetic restorations in the dental practice?

With CEREC, CAD/CAM technology has been available for chairside application for more than 27 years. So this is a well-documented process with long-term clinical success. Today, there are approximately 34,000 CEREC units in use, which demonstrates impressively that the technology is still driving aesthetic dentistry in the clinical practice.

The main indications are inlays, onlays, partial crowns, full crowns and veneers. In addition, up to four-unit posterior bridges are now possible, either as a temporary solution with polymer blocks (e.g. Telio CAD, Ivoclar Vivadent) or as a permanent restoration with a high-strength zirconium dioxide/lithium disilicate material (e.g. IPS e.max CAD-on, Ivoclar Vivadent).

What are the aesthetic limitations of chairside CAD/CAM?

Generally, posterior restorations like inlays, onlays and crowns can be realised with good aesthetic results. With anterior restorations like crowns and veneers, the aesthetic outcome largely depends on the adjacent teeth that we have to match intra-orally. Highly aesthetic colour gradients for CEREC restorations can be achieved with polychromatic blocks (e.g. IPS Empress CAD Multi, Ivoclar Vivadent) or by shading and staining monochromatic lithium disilicate blocks (e.g. IPS e.max CAD, Ivoclar Vivadent).

All this can be carried out by the dentist chairside. If the adjacent teeth show visible internal structures like mamelons, dentists need the support of dental technicians to optimise aesthetics—this represents the aesthetic limitation of chairside CAD/CAM.

Have restorations become more complex with chairside CAD/CAM?

On the one hand, yes, the procedure has become somewhat more complex because the dentist is also responsible for the design, milling and surface finishing of the restoration. On the other hand, impressions and temporaries are no longer necessary, which makes restoration easier for both the dentist and the patient.

What are the critical factors for achieving successful long-term clinical outcomes?

In addition to the factors described above, cementation, particularly for glass-based ceramic restorations, is a clinical step of paramount importance for long-term clinical success, since it is directly linked to the aesthetic outcome and the fracture strength of the final restoration. Which ceramics have to be bonded? Which ceramics can be cemented conventionally? How does one prevent post-operative sensitivity after cementation? All these questions will be answered in detail during the lecture.

Many speak of CAD/CAM technologies as the next revolution in dentistry. Do you agree?

I would say that the revolution will continue. I am still fascinated by the materials and the manufacturing process. All-ceramic restorations are not only aesthetically pleasing but also minimally invasive. Therefore, patients benefit not only from better looking teeth, but also from the fact that much less natural tooth substance has to be removed compared with traditional restorative techniques and materials.

The next few years will show what CAD/CAM manufacturers have kept in the box. chairside and labside. Materials manufacturers like Ivoclar Vivadent will continue to develop highly aesthetic and user-friendly all-ceramic systems that aim to further reduce the minimum material thickness—requiring even less invasive tooth preparations—to the benefit of the patient.

Thank you very much for this interview.

Christian organisation in the Philippines breaks dental world record

MANILA, the Philippines: Recently, a medical and dental mission organised by the Church of Christ in Manila in the Philippines broke the world record for the most people involved in a dental health check. Over 4,100 people were examined within eight hours by the mission in the Philippines’ capital in the second weekend of July, according to Guinness World Records in London.

The previous record was 3,377 people, checked during an oral health event organised by the Indian Dental Association and Weigley in Mumbai in October 2009. With 66,322 people checked, India still holds the world record for the most people involved in a dental examination in multiple locations since November 2010.

Guinness currently recognises a couple of dental records, including the longest tooth extracted and the oldest person to have received dental implants.

In addition to the most dental checks performed on one day, the Manila mission also broke two other records in the most blood pressure readings and blood glucose level tests categories. According to Guinness representative Tarika Vara, it was the first time that three records were broken simultaneously. She remarked that the standard of the health checks was very high and of great benefit to all those involved.

Over 1,000 medical and dental professionals are reported to have taken part in the event, which saw overall attendance by 100,000 people. The mission also provided medication, minor surgical treatment and relief food packs.

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British researchers discover the origin of teeth in fish

BRISTOL, UK: The evolutionary origin of dental structures is highly debated among experts. Now, a team of international scientists has found evidence that tooth-like structures were present in the first jawed vertebrates, although it had long been assumed that teeth developed later. The new findings indicate that teeth developed alongside or shortly after jaw structures.

The researchers discovered the origin of both teeth and jaws through studying fossils of Compagopiscis, one of the first prehistoric jawed fish. While performing 3D microscopy, they were able to visualize every tissue, cell and growth line within the fish’s jaws, allowing them to study the development of the teeth, said Dr Martin Rücklin, lead author and researcher at the University of Bristol’s School of Earth Sciences.

The piece of jawbone with five teeth still attached was discovered long before the team’s research was conducted. It was excavated from a cave wall near the village of Loche, Istria, in Slovenia and was initially dated based on associated fauna remains, which traced to the Upper Pleistocene era.

The team reported that the specimen was considered to be “one of the most ancient anthropological remains from the northern-Adriatic area.” But the find had never been subjected to detailed analysis until the researchers secured permission to study the mandible using state-of-the-art scanning technology and radiocarbon dating techniques.

Permission was granted by Italy’s Natural History Museum of Trieste, to whom the original finders had donated the specimen. The mandible, determined to be from a male who died in his 20s, was described by the team as, “the left portion of an isolated adult mandible bearing a canine, two premolars, and the first two molars.”

The 12-person team of researchers from university and governmental facilities in Italy and Australia used synchrotron radiation computed microtomography, accelerator mass spectrometry radiocarbon dating, infrared spectroscopy and scanning electron microscopy to separately analyze the tooth, bone and filling material.

Based on the radiocarbon analysis, the mandible was dated to an age range of 6,655-6,440 years Before Present and the filling 6,645-6,440 years BP.

The researchers listed several previously known examples of ancient dentistry but said there was no known published documentation of the use of “therapeutic palliative substance in prehistoric dentistry.” The research team also referenced documentation on the use of beeswax as a binding agent in antiquity—and the finding of a human partial denture, determined to be from a male who died in his 20s, was described by the team as, “the left portion of an isolated adult mandible bearing a canine, two premolars, and the first two molars.”

Growing a tooth in the future?

Researchers from Ireland think that coconut oil may be of great interest to the oral health industry in the future because a new study has found that its natural antibiotic properties strongly inhibit the growth of bacteria that cause oral infections. They suggest that the oil could be integrated into commercial dental consumer products to combat tooth decay.

In clinical tests, the researchers discovered that coconut oil that had been treated with enzymes similar to those found in the digestive tract was most effective in blocking the development of most strains of Streptococcus mutans, including Streptococcus mutans. Additional tests revealed that the same enzyme-modified variant of coconut oil was also harmful to Candida albicans, the yeast that causes oral thrush, among others.

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Coconut oil could reduce caries

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Stone-age dental filling identified

SAN FRANCISCO, USA: A team of Italian and Australian researchers appears to have found physical proof that restorative dentistry dates to the Stone Age. The researchers identified traces of a dental filling made of beeswax in a Neolithic human tooth disco- revered in Slovenia, and they are saying it may be the “earliest known direct evidence that restorative dentistry dates to the Stone Age.” The researchers identified traces of a dental filling made of beeswax in a Neolithic human tooth discovered in Slovenia, and they are saying it may be the “earliest known direct evidence of restorative dentistry discovered in the Neolithic era.”

The issue of tooth bioengineering has been recently re-ignited, as the development of tooth-like structures in non-dental cells has been taken up again more recently, as the development of tooth-like structures in non-dental cells has been taken up again more recently, as medical and dental scientists continue to explore the possibility of using these cells to grow new teeth. However, the question of cells for human tooth bioengineering is still unanswered. Adult human teeth do not contain stem cells but they may not provide a suitable source. Therefore, it is likely that non-dental cells will have to be reprogrammed for this purpose of clinical tooth regeneration. In addition, there are several other remaining challenges such as those of tissue size, tooth identity, crown shape, and composition of the mineralised tissues. The creation of functional roots presents perhaps the biggest challenge that needs to be addressed before bioengineering of teeth will be feasible.

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Hopes of growing teeth have been supported by the occurrence of supernumerary teeth in the jaws, as well as by fully developed teeth in teratomas. The issue of tooth bioengineering has been taken up again more recently, as scientific breakthroughs in the fields of genetics and developmental biology have led to a completely new level of understanding about how teeth develop. Basically, tooth formation is regulated by a chain of interactions between two different tissues, epithelium and mesenchyme. And importantly, we actually know that the language that cells and tissues use for communication consists of defined signaling molecules.

Currently, the most realistic scenarios for tooth regeneration involve the generation of teeth from stem cells with the capability to form teeth. The technology would be based on trad-