CEREC News
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Editorial:

CEREC opens doors

CEREC has just celebrated its 25th anniversary. In August this quarter-century of technological progress was celebrated in Las Vegas and received extensive media coverage. The emphasis was not so much on the past two and a half decades as on the future. The key question is: how will dentistry and sophisticated medical technology develop in the coming years? The importance of CEREC cannot be over-estimated in this context. But what does this mean in concrete terms? It would be true to say that CEREC is constantly opening up new avenues in computerized dentistry. From digital impressions to patient-specific, biogeneric occlusal surface design and high-precision digital models – these key CEREC features will facilitate a breakthrough into new disciplines. For instance, it is now possible to merge three-dimensional X-ray data with CEREC data. As a result, dentists know in advance which implantation techniques and tissue-management methods they should adopt and can show patients how the implant and finished restoration will look like before commencing surgical intervention. In the future it will be possible to mill surgical guides directly on the CEREC system. This will enable dentists to perform all the necessary steps during a single treatment session – beginning with X-ray diagnostics and ending with a highly aesthetic implant-borne restoration. Consequently, they will be able to generate more added-value in their dental practices. Thanks to CEREC, the door between implantology and restorative dentistry is now wide open. In addition, the CEREC Connect portal paves the way to direct communication with dental laboratories. In other words, dentists can decide freely which tasks can be performed 'in-house' and which should be assigned to an external dental lab.

The opening of doors and the integration of different technological disciplines are the defining features of the digital age. This process was neatly summed up by German author Erich Kästner: "While they researched, X-rayed, filmed and radioed, the most marvellous invention emerged of its own accord: that the detour is the shortest distance between two points." At Sirona we are committed to finding detours that will productively integrate all the major dental disciplines – frequently with the aid of CEREC.

Your CEREC Team

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1. CEREC 25
more than 3,000 guests from 38 nations celebrated with us in Las Vegas

A resounding success! More 3,000 guests from 38 countries attended the three-day international symposium marking the 25th anniversary of CEREC. This impressive celebration at Caesars Palace, Las Vegas, which ran from 26-28 August, brought together distinguished representatives of the digital dental community. The attendees were much impressed by the diversity and quality of the lecture program, by the exhibition featuring 80 partner enterprises and – of course – by the closing "White Night" party at the nightclub "Pure".

For a long time the CEREC System was the only computer-aided restoration system that boasted optoelectronic impression-taking capabilities. Today it is the world's most widely used CAD/CAM system for all-ceramic restorations. No other competing system can look back on a successful 25 year track record. The symposium did not just look back to the past, however. More than 50 speakers analyzed the CEREC success story and gave fascinating insights into the future potential of this innovative technology. Dental practices and laboratories now have access to an enormous spectrum of indications and applications, as well as to interfaces for networking with external systems.

Professor Fasbinder pointed out that CEREC restorations have demonstrated their longevity in numerous clinical trials. The so-called "gold standard" is no longer exclusively reserved for metal-based restorations. Professor Mörmann emphasized that CEREC has not stood still. On the contrary, the system now forms the nucleus for networked applications – for example, "impression-free" treatment and integrated digital radiography.

Professor Mehl focused on biogeneric occlusal surface design. This was augmented by practical
reports given by the US dental practitioners Klim, Park and Puri, who confirmed that the biogeneric software is a highly effective tool for fabricating crowns. The dentist Skramstad and the dental technicians Nieting and Sikes described the possibilities for exchanging virtual models via the CEREC Connect web portal. This portal is used by the Glidewell Laboratory, which has 2,600 employees on its payroll. To an increasing extent Glidewell is receiving online orders for crowns and bridges from dental practices within the CEREC Connect network. The dentists Agarwal, Bindl, Kusama, Reznick and Patel talked about the possibilities for importing CEREC scans into CBCT images (GALILEOS). This enhances the precision of the implant planning process and minimizes the risks of implant therapy.

Thanks to CEREC, aesthetic restorations are now available at various price levels. The speakers in Las Vegas described how monolithic feldspar and lithium disilicate crowns can be polished, glazed, characterized or veneered using the cutback method. These techniques serve two goals: to fulfill individual aesthetic requirements, and to adapt to the patient's individual financial resources. CEREC has become rapidly established in the USA, a market which is traditionally quick to adopt new advances in medical technology. "Yes, we scan," concluded Gordon Christensen (CRA Newsletter) and predicted dynamic future growth for CEREC. This CAD/CAM system fulfills the increasing demands in terms of productivity, flexibility and cost-effectiveness. Las Vegas clearly demonstrated that CEREC has the potential to continue setting the standard in dental CAD/CAM technology.

We are already looking forward to the next anniversary celebration.

2. Digital technology expands the spectrum of clinical applications

18th Annual Meeting of the DGCZ and CEREC Master Course

The 25th CEREC Anniversary Celebration in Las Vegas featured a major CAD/CAM Symposium, which underscored the impressive rapid progress being made in digital technology. Soon after this key event, the 18th Annual Meeting of the German Society for Computerized Dentistry (DGCZ) in Ettlingen opened new perspectives on computerized procedures in dental practices and laboratories. Leading academics from various universities contributed thematic highlights: Professor Edelhoff, Munich, introduced some new treatment concepts; Professor Frankenberger, Marburg, focused on adhesive bonding techniques; Professor Kordaß, Greifswald, described the new CAD/CAM master’s degree program; Professor Mehl, Zurich, talked about digital impression-taking and biogeneric modeling; PD Dr. Scherrer, Geneva, dealt with the topic of zirconium oxide machining; and PD Dr. Reich, Aachen, discussed the indications-oriented selection of ceramic materials. Here is a brief summary of the many topics on the agenda:

Professor Albert Mehl, Zurich, compared CEREC quadrant scans with measurement data acquired with the aid of a calibrated, stationary reference scanner. He established a mean deviation of 35 µm. According to Mehl, this deviation is still clinically acceptable – even for bridge restorations within a single quadrant. With the aid of new whole-jaw measuring methods he was able to demonstrate that conventional impression-taking methods (e.g. polyether compound combined with a stone model) result in deviations of approximately 43 µm. It will be possible to achieve further significant improvements in accuracy by making adjustments to the CEREC software.

New treatment concepts

Professor Daniel Edelhoff, Munich University, discussed the topic of bite elevation and the creation of functional support zones. Initially, these so-called "table tops" are performed as long-term temporary restorations with the aim of modifying the patient’s bite relationships and functions. Following this, the permanent all-ceramic restoration is placed. These temporary repositioning onlays can be created out of PMMA blocks using the CEREC or inLab milling machine. The list of suitable materials is as follows: Artegral, Merz; CAD-Temp, Vita; Everest C-Temp, KaVo; Paradigm MZ 100, Espe; Polycon, Straumann and Telio CAD, Ivoclar. The preparatory treatment of the occlusal surface is minimally invasive. The layer thickness of the PMMA material (Telio) can be reduced to 0.3 mm. The PMMA blocks are also suitable for temporary crown and bridge restorations. According to Edelhoff, anterior bridges with up to two pontics can remain in situ for a maximum of 12 months.

PD Dr. Sven Reich, Aachen University, analyzed the growing range of CAD/CAM-machinable materials. CEREC and inLab machinable polymers with a flexural strength of between 80 and 130 MPa are now available for long-term temporaries such as those used for peri-implant...
soft tissue modeling. According to Reich, the minimum wall thicknesses should be 1.5 mm (occlusal) and 0.8 mm (cervical). In the case of anterior bridges with one or two pontics the connector cross-section should be no smaller than 12 mm². In the case of posterior bridges the connector cross-section should be no less than 12 mm² (one pontic) and 16 mm² (two pontics). Lithium disilicate ceramics (LS2) can be used for anterior and posterior crowns. Here the dentist has the option of using monolithic crowns – i.e. crowns without a separate ceramic facing. The flexural strength of these monolithic crowns (360 MPa) is clearly superior to that of veneering ceramics (80 MPa). According to Reich, this results in a lower failure rate compared with veneered ZrO2 crowns, which are more prone to chipping.

Rapid layer technique prevents chipping

Veneering ceramics are applied to metal or oxide ceramic frameworks in order to fulfill aesthetic functions. However, veneering fractures (chipping) in ZrO2 crowns and bridges are a much-discussed issue in professional circles. In this context Dr. Klaus Wiedhahn, Buchholz, described the Rapid Layer technique (Vita) – also known as “CAD-on” (Ivoclar). This new veneering technique offsets low tensile-stress resistance and the low flexural strength (40 MPa) of layered sintered glass ceramics (fluorapatite). The veneer facing is computer-milled out of a feldspar ceramic block and then sintered (Ivoclar) or adhesively bonded (Vita) to the ZrO2 framework. When computing the ZrO2 framework, the CAD software (CEREC V3.80) subtracts the veneer thickness from the biogenerically generated, anatomical exterior dimensions of the restoration. The software breaks down the framework (primary structure) and the undercut-free veneer layer (secondary structure) into two data records for separate milling processes. The veneer is milled out of feldspar ceramic (Triluxe forte; Vita) or lithium disilicate (e.max CAD-on; Ivoclar) and then polished. It is then adhesively bonded to the framework using monomer phosphate or a self-adhesive composite (Vita Rapid Layer). In the case of the Ivoclar CAD-on technique the veneer is sintered to the framework. This creates a tension-free bond at the interface between the veneer and the framework, thus reducing the risk of chipping. The minimum wall thicknesses of the framework and veneer are automatically monitored.

Jörg Haselbauer, Bensheim, reported on the CEREC Connect software. With the aid of this software the dentist can transmit digital models to a dental laboratory for further processing. This has proved to be a highly practical procedure and has opened up new fields of application for the CEREC system in dental laboratories. According to Reinhard Pieper, Bensheim, it will soon be possible to mill virtual jaw models in dental laboratories. Within the framework of the implant planning process it will likewise be possible to create surgical guides directly in dental practices and laboratories.

An extensive report on the Annual Meeting will be published soon in the scientific media. Alternatively, you can order a PDF version from kern.ag-keramik@t-online.de

3. CEREC Connect software V3.83 now available as a free download

Since the beginning of September version 3.83 of the CEREC Connect software has been available as a free download in the participating markets. Dentists in the United Kingdom and the Netherlands can now visit the website www.cerec-connect.co.uk. American and Canadian dentists can download the software from www.cerec-connect.com.

Key priorities when developing the new software version were to improve performance and speed up the digital impression-taking process. Thanks to the availability of new algorithms, the individual images can now be processed much more quickly. At the same time the precision of the models has been further enhanced.

As a CEREC AC user you can adopt digital impression-taking without any further capital outlay. You already own the necessary hardware and can download and install the software free of charge. Digital impressions are no longer restricted solely to single-tooth restorations. You can now spare your patients the discomfort of the impression tray in connection with labside restorations as well. Whenever you want to place a layered anterior crown or a three-unit bridge (longer span bridges will be available in the near future) you can use your CEREC Bluecam to create a digital impression. Via the CEREC Connect portal you then transmit the three-dimensional model to your partner laboratory. On the basis of this data the laboratory can order a physical model and – in parallel – begin the design work.

A precondition for digital collaboration is that the laboratory and your dental practice both register with the CEREC Connect portal. To be able to process your data the laboratory must have installed version 3.80 (or higher) of the inLab software. CEREC Connect is currently available in the following markets: Germany, Austria, Switzerland, the Netherlands, Belgium, France, the United Kingdom, Italy, the USA and Canada. Further markets will be added in the future.

4. Safety-first implant therapy

IMPLANT-BASED PROSTHETICS. The integration of GALILEOS and CEREC enhances the safety and precision of implant therapy. Two US-based dentists – Neal S. Patel, DDS, from Powell, OH, and Jay B. Reznick, MD, MDM, from Tarzana, CA – report on their experience with integrated implant planning.

Cone beam computerized tomography (CBCT) systems number among the most advanced imaging devices that are currently available on the market. The insight into the third dimension simplifies diagnostic procedures, enhances treatment safety, and reduces radiation doses for patients. In addition, there are convincing forensic arguments in favour of CBCT. With the aid of three-dimensional CBCT images users can interpret the clinical situation with much greater accuracy. They can evaluate the optimum drilling angles for various perspectives (sagittal, coronal, axial) and generate transversal slices and panoramic images. Compared with conventional CTs, CBCT systems are less sensitive to metal artefacts. Thanks to the availability of three-dimensional imaging, dentists are in a better position to assess the risks of treating certain
cases ‘in-house’. In addition, CBCT users can create digital networks with their colleagues and advertise their services to referring dentists. An important reason for purchasing a CBCT system is the time and effort involved in referring patients to external radiologists – both for the patient and the dentist. In some cases patients do not return after being referred. In addition, the diagnostic results are sometimes delayed, and the reports are not directly assigned to the X-ray images. Referrals to external radiologists tend to disrupt the patient counselling process. Experience has shown that patients rate the expertise of a dental practice more highly when all services come from a single source and when the dentist is directly involved in the diagnosis of the X-rays. The higher costs of a CBCT image compared with a conventional panoramic X-ray can be easily justified by referring to the clear diagnostic and therapeutic benefits. A convincing argument is that a CBCT contains 300 MB of information – as compared with only 5 MB in the case of a digital panoramic X-ray.

Implant planning using GALILEOS and CEREC reduces the number of appointments. Less laboratory work is required. In most cases it is not necessary to produce waxed-up prosthetic reconstructions. The combination of digital imaging and computer-aided design generates all the necessary information for the dental lab, thus ensuring transparent working procedures. The decisive factor is that the integration of GALILEOS and CEREC streamlines the dentist’s workflow and leads to reliable clinical results.

Enhanced clinical reliability...

A very useful feature of the GALILEOS system is the built-in implant database, which contains the dimensional data of various commonly used endosseous posts (Astra, Straumann, 3i, Bicon, BioHorizons and Z-Look). By combining the GALILEOS image, the clinical CEREC scan and the virtual superstructure design the user can dispense with a prosthetic wax-up model. Instead, a template is used that is easily fixedated in the patient’s mouth. The prosthetic planning is carried out fully digitally by using the CEREC software. Thereafter, the prosthetic planning data is imported into the CBCT scan, eliminating both the need to create a X-ray template and to form a barium sulphate prosthetic model. This leads to more precise results. Moreover, since no barium-sulphate is used, the CBCT image does not lack in quality. The positions of the endosseous drill holes are determined by means of plastic surgery guides (SICAT/Sirona). Minimally invasive flapless implantation eliminates the need for the elevation of the mucoperiosteal flap. This not only minimizes surgical trauma, but also permits the immediate placement of the restoration on the implant.

.... and less laboratory work

The ability to import the CEREC data into the CBCT image significantly streamlines the implant planning workflow. The interaction between GALILEOS and CEREC means that only two appointments are required, at an interval of five to seven days. Thanks to the surgery guide, the invasive surgical insertion of the endosseous post takes only 15 minutes – resulting in greater precision and reduced stress. Using the conventional method (i.e. without a CBCT scan and surgery guide) each implant requires up to 45 minutes and is accompanied by greater risks.

So far custom-made angled abutments with individual emergence profiles have often been required in order to compensate for divergences in the insertion angles between the implants and the superstructures. Thanks to the integrated implant planning process, it is now possible to deploy competitively priced, industrially prefabricated abutments. The precise planning of the angulation in the CBCT image and the guided drilling process ensure a better fit between the endosseous post and the superstructure. If required, specially shaped abutments can be created out of zirconium oxide using the inLab system. As a rule the implants are luted directly to single-tooth implants. To protect the gingiva, overpressed luting residues must be carefully removed. Following the attachment of the abutment and the closure of the screw access, it is advisable to place a retraction cord in order to expose the tissue and the abutment margin. The abutment is then conditioned with titanium powder in preparation for acquiring the intraoral impression using the CEREC AC and designing the final implant crown. The crown is then automatically milled to anatomical dimensions out of a lithium disilicate block (e.max CAD). The try-in should be performed prior to crystallization. This is followed by crystallization, polishing/glazing and luting to the abutment. If stringent aesthetic requirements have to be fulfilled (e.g. in the anterior region) the LS2 crown can be cut back and then individually veneered.

Conclusions

To a significant extent GALILEOS and CEREC simplify implant planning and superstructure fabrication. The clinical outcomes are predictable. Compared with conventional methods, treatment is much faster. The 3D images and the virtual prosthetic proposal play a valuable role in patient counselling. There is an increased likelihood that the patient will accept the plausibility of the proposed treatment and give his or her consent more quickly.

Neal S. Patel, DDS, dentist in Powell, Ohio, and Jay B. Reznick, MD, DMD, dentist in Tarzana, near Los Angeles

5. RealLife: a new dimension in CEREC blocks

With its innovative VITABLOCS RealLife, VITA Zahnfabrik has set new standards in anterior tooth aesthetics. This feldspar ceramic block became available in June of this year. Thanks to the block’s unique three-dimensional structure consisting of a dentine core and enamel facing (see Fig. 1), users of the CEREC/inLab V.3.80 software are now able to reproduce the natural shading progression between the cervix and the incisal edge.
The design process is the same as for other CEREC crowns. In the biogeneric design mode the three-dimensional RealLife block contours are transparently visualized in the milling preview and can be adapted according to individual requirements. With just a few mouse clicks the planned restoration can be adapted to the shade nuances of the natural adjacent teeth. With the aid of the familiar software tools (Position, Rotate) the restoration can be placed at the desired position within the block. This opens up a wide range of new design possibilities (see Fig. 2).

Fig. 1: VITABLOCS RealLife

Fig. 2: VITABLOCS RealLife with a schematically visualized crown

6. CEREC Zeitung

These are fast-paced times; changes seem to occur almost every day. This also applies to dentistry and dental technology, where new methods of treatment and innovative work techniques are constantly being discussed. And where questions such as: “Do I really need this?” “Should I invest here?” “Will this be a lasting innovation” or “Will it already be replaced by another one tomorrow?” constantly arise. Take for example the computer-aided manufacture of full ceramic restorations. During the past few years, technological quantum leaps have been achieved in this area and high-performance ceramic materials have entered the market. And yet the same old question is still being asked: “Are these systems adequately perfected, practically tested and proven, economically justifiable and future-safe?”

This is the gap that the “CEREC Zeitung” newspaper intends to close. It provides information for everyone interested in the clinical and technical aspects of modern CAD/CAM technology in dentistry. Materials, techniques and equipment are introduced, new topics discussed and interesting information brought into focus – always under the perspective of “What can I do better, faster, more simply or more economically than with my traditional possibilities?”.

Software and hardware specialists and users of CAD/CAM from clinics, practices and laboratories will use this forum to provide scientific evidence as a basis for your future decisions concerning computer-aided dental restoration systems.

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7. CEREC service pack V 3.83

With immediate effect the new CEREC service pack V 3.83 is available as a free download from the Sirona website.

We recommend that you install this service pack, which contains the following software improvements:

- Pre-positioning tool: in all the anatomical design modes the position and size of the initial proposal can be modified via the “Design” menu. (This tool was previously accessible by clicking the red “Undo” button.)
- The biogeneric proposals – above all in the anterior area – have been further improved.
- CEREC Blocs and CEREC Blocs PC have now been approved for the indication “thin veneers”.

The software version V 3.80 is a prerequisite for installing service pack V 3.83.

Have fun with the new service pack.
