Saliva and Oral Health

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The presence of saliva is vital to the maintenance of healthy hard (teeth) and soft (mucosa) oral tissues. Severe reduction of salivary output not only results in a rapid deterioration of oral health but also has a detrimental impact on the quality of life for the sufferer.

An understanding of saliva and its role in oral health helps to promote awareness among oral health care professionals of the problems arising when the quantity or quality of saliva is decreased; this awareness and understanding is important to the prevention, early diagnosis and treatment of the condition. There is an extensive body of research on saliva as a diagnostic fluid. It has been used to indicate an individual's susceptibility to developing caries; it has also been used to reflect systemic physiological and pathological changes which are mirrored in saliva. One of the major benefits of saliva as a diagnostic fluid is that it is easily available for non-invasive collection and analysis. It can be used to monitor the presence and levels of hormones, drugs, antibodies, microorganisms and ions.

Factors Influencing Salivary Flow Rate and Composition

The following article provides an overview of the differences in flow rate and composition between unstimulated saliva (secreted continuously in the absence of exogenous stimulation) and stimulated saliva (secreted usually in response to masticatory or gustatory stimulation), the factors influencing salivary flow rate and composition, and their physiological importance.

Unstimulated saliva

Unstimulated whole saliva is the mixture of secretions found in the mouth in the absence of exogenous stimuli such as tastants or chewing. It is composed of secretions from the parotid, submandibular, sublingual, and minor mucous glands but it also contains gingival crevicular fluid, desquamated epithelial cells, bacteria, leucocytes (mainly from the gingival crevice), and possibly food residues, blood, and viruses.

Several large studies of unstimulated saliva flow rates in healthy individuals have found the average value for whole saliva to be about 0.5-0.4 ml/minute, but the normal range is very large and includes individuals with very low flow rates who do not complain of a dry mouth. Such a broad normal range makes it difficult to say whether or not a particular individual has an abnormally low flow rate. Unless saliva is almost completely absent, patients can be said to have a dry mouth (xerostomia) only on the basis of their subjective symptoms. However, a flow rate of <0.1 ml/min is considered objective evidence of hyposalivation.

Whether the flow rate is high or low is much less important than whether it has changed adversely in a particular individual. Physicians will often take a patient’s blood pressure as a yardstick for future measurements. Dentists, however, do not routinely measure the salivary flow rate, so that when a patient complains of having a dry mouth, it is impossible to judge whether or not a genuine reduction in flow has taken place. It would therefore be very advantageous if dentists included measurement of salivary flow as part of their regular examination. Just as there are individuals with very little saliva but without discomfort, so there are others with flow rates within the normal range who feel that their mouth is drowning in saliva. This problem is often due to difficulty in swallowing, rather than to a genuinely high flow rate.

Factors affecting the unstimulated salivary flow rate

- **Degree of hydration** – This is potentially the most important factor. When body water content is reduced by 8%, the salivary flow rate decreases to virtually zero.
- **Body posture** – Flow rate varies with position and a person when standing or lying will have a higher or lower flow rate, respectively, than when seated.
• Biological rhythms – Circadian rhythms are rhythms with a period of about 24 hours and include the rhythms in body temperature and in salivary flow. The body temperature and flow rate of saliva peak during the late afternoon but the flow rate drops to almost zero during sleep. This circadian rhythm also has important clinical implications for the timing of oral hygiene. The most important time to clean the teeth is probably at night before going to sleep, since the presence of plaque and food debris and a greatly reduced salivary flow during sleep provide optimum conditions for progression of dental caries.

• Functional stimulation – Further studies are needed to clarify whether regular stimulation of salivary flow, as by use of chewing gum, leads to an increase in the unstimulated flow rate, although there is evidence that it increases the stimulated flow rate

Stimulated saliva

This type of saliva is secreted in response to masticatory or gustatory stimulation; several studies of stimulated salivary flow rates have been done in healthy populations and show a wide variation among individuals. Many factors influence the stimulated salivary flow rate which, for whole saliva, has an average maximum value of about 7 ml/minute.

Factors affecting the stimulated salivary flow rate

• Chewing gum – Research shows the flow rate is high initially but after about ten minutes, as the flavour and sweeteners leach out and only the gum-base remains, it falls to the rate obtained by chewing gum-base alone, namely to two to three times the unstimulated rate. This increase in salivary flow during gum chewing can be maintained for as long as two hours and this may be very beneficial to those with a dry mouth. Even after two hours of gum chewing, the salivary glands do not become ‘exhausted’ and introduction of a fresh piece of gum causes a secretory response similar to that initially.

• Mechanical stimuli – The action of chewing, in the absence of any taste, will itself stimulate salivation but to a lesser degree than maximum gustatory stimulation with citric acid.

• Gender, gland size and unilateral stimulation

Most studies have found that females have lower salivary flow rates than males and a recent study7 showed that in females, the sizes of the major salivary glands are smaller than in males. Additionally, if one habitually chews on one side of the mouth (for instance with chewing gum), most of the saliva will be produced by the glands on that side after the initial tastsants in the gum have been leached out.

• Age – Many elderly people receive medication and the greater the number of drugs taken, the greater is the tendency for reduction in salivary flow.

Salivary flow rate and oral health

The unstimulated flow rate is more important than the stimulated flow for oral comfort, since only a small fraction of the day (54 minutes in a group of dental students) is spent eating. However, stimulation of the glands through mastication is beneficial in terms of promoting clearance of food from the mouth and may help by causing an increase in the unstimulated flow rate, although further studies of this are needed. A study has shown that two sugar-free chewing gums, one containing chlorhexidine, used by a group of frail, elderly, dentate subjects over a one-year period, led to improved oral health and a statistically significant 55-100% increase in their stimulated salivary flow rate. This suggests that if the glands are stimulated regularly, their secretory ability may increase. Unfortunately, unstimulated flow rates were not measured in that study.

Carbohydrate clearance from the oral cavity

One major role of saliva is the clearance of carbohydrate from the mouth. The more rapid the flow, the faster the carbohydrate is cleared. This is true whether the saliva is unstimulated or stimulated, for example by chewing gum. If the gum contains sweeteners such as xylitol or sorbitol, which are minimally metabolised by plaque bacteria, then the increased salivary flow will be very effective in clearance of cariogenic carbohydrates remaining from previously consumed food.

The composition of saliva

The composition of saliva is affected by many factors, such as the type of salivary gland producing the saliva. For example, most of the amylase in saliva is produced by the parotid glands while blood-group substances are derived mainly from the minor mucous glands.

Factors affecting salivary composition

• Flow rate – The main factor affecting the composition of saliva is the flow rate. As the flow rate increases, the pH and concentrations of some constituents rise (e.g. protein, sodium, chloride, bicarbonate), while those of others fall (e.g. magnesium and phosphate).

• Duration of stimulation – When the salivary flow rate is held constant, the composition of the saliva depends on the duration of stimulation.6

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Clinical and diagnostic advantages of PreXion 3-D imaging system

By Dan McEowen, DDS

For nearly 100 years, dentists have relied on 2-D radiographic imaging for diagnosis and treatment planning. With the 1999 introduction of cone-beam computed tomography (CBCT), all dentists now have tools available for more accurate diagnosis and treatment.1

The ability to look at a tooth in any direction and orientation, as well as in 5-D, eliminates much of the guesswork commonly experienced with 2-D radiographs. We have been limited in most cases to only a buccal-lingual view provided by periapicals, bitewings and panoramic radiographs with the occasional axial view of an occlusal film. Medical CT scans and images began in the early 1970s and were sometimes used by doctors, serving as our first multiplier views.2

The adoption of 3-D cone-beam imaging is appropriate and has important advantages for all modalities of dentistry. From every specialist to the general dentist, the increased amount of radiographic information as well as increased accuracy will aid in the most sound diagnostic possibilities.

CBCT description

CBCT is a single or partial rotation of an X-ray source around the head, capturing X-rays on various flat panel arrays and sensors. The information is converted to a series of axial slices by computed tomography and stored as virtual anatomy in the computer. With the use of sophisticated software, the dentist is able to view information in several different views, including: axial slices (head-to-toe orientation), coronal slices (front-to-back orientation), sagittal slices (side-to-side orientation) all known as multiplanar reconstructions (MPR). The thickness of each slice can be varied to include more or less information.

Because the voxels (volumetric pixels 3-D) are isotropic, other MPR images can be generated by slices drawn at an angle to capture thickness through the scan to view areas critical to the final diagnosis.6

The final view offered by CBCT is a 3-D view that can be rotated and viewed in any direction. Once again through software manipulation, 3-D images can be viewed as conventional radiographs, maximum intensity projections (MIP), soft-tissue projections and a variety other views.7

The evaluation of the available bone for the initial implant placement can be crucial for the long-term success of the case. If there is inadequate bone available, grafting may be a necessity. CBCT studies render the most accurate information available at a low radiation dose. The periapical shows an obvious lack of bone height, but does not show the buccolingual dimensions or an accurate view of the sinus morphology (Fig. 1).

The MPR view of the CBCT shows all necessary measurements to perform the sinus lift and grafting with the immediate placement of the implant fixture (Fig. 5). Three-dimensional views show the floor of the sinus and any soft-tissue pathology (Fig. 4). Having accurate measurements in all dimensions is an advantage of CBCT scanning.

CBCT and endodontics

Endodontics is a field that is rapidly adapting the use of CBCT and for good reason. The inherent geometric deficiencies of 2-D radiographs make the CBCT scan a valuable adjunct to investigate the root morphology in both 3-D and MPR. The typical endodontic treatment can show superimposed canals in the anterior, buccal and lingual as well as unwanted bone densities as well as the affected tooth making the image quality poor.2

The ability to view MPR slices in cross-section, long axis and oblique directions gives the ability to follow all canals in any direction and show their relationship and measurements in both the hard and soft tissue structures. This virtual tour of the root morphology is a great benefit in the final treatment outcome (Fig. 5).8

Post root-canal infection can be difficult to diagnose with the standard periapical. The endodontic fills may appear to be normal even though other clinical findings and symptoms are abnormal. The patient presents after several months post root-canal treatment with pain on palpation and pressure and avoids this side of the mouth. A periapical radiograph shows minimal pathology (Fig. 6). The roots appear to be filled and a small puff of sealer extends through the apex of the mesial roots. The distal root structure and fill appear normal. There is little indication of periapical radiolucency and no evidence of the periodontal ligaments of the mesial roots.

A CBCT scan reveals a completely different picture. The coronal MPR reveals a short fill near the apex of the mesial root lingual and a large radiolucency in the mesial root canal itself (Figs. 7, 8) not visible on the periapical radiograph (Fig. 6).

Missed canals are difficult to see in a buccolingual projection of the periapical radiograph as one canal is superimposed on the other (Fig. 9). Often, as viewed in this radiographic, we see periapical pathology with an apparent normal fill, CBCT scans allow dentists to look for pathology in CBCT planes to identify the actual problem before invasive procedures are performed on the patient. The axial view shows a lingual canal exists and is untreated. The coronal view confirms the diagnosis and treatment can be completed (Fig. 10).

Today’s endodontists, as well as general dentists, are benefiting from the diagnostic capabilities of the high-resolution CBCT scanners available over conventional 2-D periapical.10

Oral surgery

Oral surgery, with its inherent invasive nature, can be better served using CBCT with MPR as well as 5-D images. The ability to perform virtual surgery is a benefit to both the doctor and the patient. Doctors have the advantage of seeing morphologies and landmarks in real time and space with accurate measurements, using patients will gain a better understanding of the problems and the solutions their doctors are offering them. Third-molar extractions can be risky based on 2-D and panoramic radiographs.
These radiographs can often superimpose nerves and sinuses over root structures. Dentists using 2-D radiographs must often rely on experience to assess the risks of iatrogenic trauma. The use of CBCT with MPRs and 3-D images reduces any guessing as well as the chance for any permanent damage to the patient. With the adoption of CBCT, the judgment is based on solid evidence and the risk will decrease.

A panorex of the superimposed third molars gave no solid evidence the canal lies between the roots. It is only with the use of CBCT and the MPRs that the nerve can accurately be seen traversing between the mesial buccal and mesial lingual root (Fig. 11). Other surgical advantages include the ability to see the position of supernumerary or impacted teeth. The CBCT images show accurate positioning of dental implants, the ability to accurately remove the proper teeth for placement, the ability to accurately remove impacted teeth, the ability to accurately position either the mesial or distal molar, the ability to accurately position supernumerary teeth, and the ability to accurately position the mesial or distal molar.

Periodontics

The explanation of periodontal problems are often misunderstood by the patient. As doctors we talk about pockets, point to x-rays and propose treatment only to have the patient refuse treatment because they do not understand what we are clinically describing. Using the 3-D portion of the CBCT scan can improve the understanding and acceptance of treatment plans. The images are a picture of the problem that is owned by that patient and much easier to understand by the layperson. Illustrating periodontal defects and pockets allows the patient to better participate in the process (Fig. 15). The MPRs and the 3-D projections aid in surgical planning for periodontists, allowing for accurate measurements and bone analysis prior to osseous surgery that doctors cannot get using the periapicals or panoramic images. Studies have shown that CBCT images are more accurate than panoramic radiographs. For the periodontist placing implants, the ability to measure bone density and avoid important anatomy is important. Orthodontics

Orthodontists are beginning to adopt large field-of-view CBCT. Recent studies show that linear measurements of bony structures are more accurate using CBCT and have less distortion than currently used methods of measurement: lateral cephalometric, posteroanterior (PA) and submentovertex (SMVT). Accurate measurements of tooth volume and tooth position aid in accelerated treatment times and more precise treatment.

Along with tooth position, density of bone and size of arches, the orthodontist also has an accurate evaluation of the temporomandibular joint and position of the condyles. Impacted teeth are easily identified and position either buccal or lingual can be confirmed prior to movement or removal. Both MPAs and 3-D projections give the clinician a complete picture of the problems and the treatment course.

With a single CBCT scan, orthodontists can produce all of the information they need: panoramic, cephalometric, PA, SMVT, tooth size and volume, crowding evaluation in any plane, TMJ evaluation and airway analysis, all with both soft tissue and skeletal information.

Conclusion

We treat our patients in 3-D, and now, with cone beam computed tomography, we are changing the way we diagnose from 2-D to 3-D. The addition of this technology will increase your diagnostic skills with better and more complete information at your disposal. As with any type of invasive diagnostic tool, clinicians should weigh the risk to benefit in using CBCT scans.

Judicious use of CBCT and knowledge of patient’s lifetime doses should always be a consideration, as well as the availability of other diagnostic tests appropriate for the problems of the patient. When adopting new technology, training is paramount. Along with training comes the responsibility of the doctor to read and diagnose information from CBCT scans. Do not avoid CBCT from lack of knowledge; instead, take this opportunity to become a better diagnostician and radiologist. As you review radiology and pathology, your use of CBCT will aid in making the most accurate diagnosis and the most complete treatment plans.

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Clinical digital photography. Part 1: Equipment and basic documentation

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By Dr. Eduardo Mahn, DDS, DMD, PhD
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Abstract: The use of photography is becoming a standard in modern dental practice. The sharing of pictures is not only essential for communication between dentist, laboratory technician and patients but also for communication between professionals, undergraduate and postgraduate students with their teachers and for documenting of clinical procedures in cases you want to show to both patients and work colleagues at scientific meetings. This article will describe the necessary equipment for clinical photography, explain its uses and deliver the foundation for basic documentation and structure for clinical cases. The second part will discuss the step by step documentation and show practical examples to improve your results.

Introduction

The first process of photography was presented to the world by Louis J. M. Daguerre at the Paris Academy of Sciences on January 7, 1839.1 In that same year, Alexander S. Wolcott, a manufacturer of dental instruments, designed and patented the first camera producing images on a silver-coated copper plate.2 Thanks to the graphic documentation that this allowed, it created the first dental journal, the American Journal of Dental Science.3

Due to the advancement in technology, we now have the privilege of having digital photography that allows an immediate view of the results and not having to wait for the processing of films as was the case of old movies, utilizing silver halide ions in a gelatine emulsion on a strip of celluloid film to capture latent images. The advantage of digital images is that in addition to instantly seeing them through a viewfinder, there is less cost of developing film negatives and their storage is easy and fast. The power of viewing and saving images in computers also saves space and access to a database is almost immediate. By developing different virtual media files and almost universal use of email, information sharing is almost instantaneous anywhere in the world.

Because many of the procedures performed in dentistry represent established protocols that should be read, learned and then practiced, it becomes clear that photography aids us in teaching or explaining to our patients what we think are common, but to them are complex and mysterious procedures.

Digital Cameras

There are currently hundreds of cameras on the market, If we compare their features and capabilities, we can divide them into 5 groups:

Compact cameras (point and shoot), interchangeable lens cameras (mirrorless system cameras) and reflex cameras, SLRs DSLR (Digital Single Lens Reflex).

Initially, compact cameras (Figure 2) may seem appealing, but they have many limitations. They do not have a consistent image control, the position of the flash is not suitable for intraoral photography, distorted images from utilization of an insufficient macro lens in the wide-angle position, lack of manual exposure and focus problems. One of the biggest problems is the inability to change the lens, which given its design for a wide angle or middle distance, causes distortion of perspective, as the clinician would have to stand close to the patient. This has another negative effect of poor lighting.4,5

The second group seems promising, but is still in development, and the third group, DSLR cameras (Figure 5), are those with greater advantages for clinical use, thanks to the sensor size and the many options in manual mode, lenses and flashes.

These cameras use a lens for both image composition and image capture. This design, which allows direct viewing and focusing without parallax error, is ideal for dental photography.6,7,8 One of the biggest advantages is the ability to exchange lenses. For example, you can take pictures of landscapes, portraits, and all dental treatments with the same camera, by just changing the lens. The same applies with changing the flash. All professional cameras more than meet the requirements. Semiprofessional cameras (with a more affordable price) that meet these requirements are for example Nikon D7000, D90, D5100, D3200, Canon EOS 7D, 60D, 50D or other similar brands.

Flash

The discussion with which flash, macro lateral or twin flash light (Figure 4) or ring flash (Figure 5), is most suitable for intraoral photography, and has been a quite discussed topic for many years.9

The ring flash light is the favorite amongst inexperienced dental photographers and it is considered the universal flash system for general macro photography.10,11 On the one hand, it is true that the greater the distance between the ring flash and the subject, the flatter, less texturized and refined the photos are, while a twin flash generates pictures with more texture, contrast and that look more alive.12

The macro lateral flash shows more variability in light direction, allowing certain details to be highlighted. The overall hue of color, cracks and also transitions are best captured with the macro lateral flash.13 Probably the only drawback, besides its higher cost, is when photographing posterior regions, where access and space is limited. In these cases, the homogeneous light and easy handling of the ring flash has an advantage. In the author’s experience, when a clinician decides to begin clinical photography, a ring flash is more
than adequate; the extra cost of the macro lateral flash is not justifiable, since differences in the early stages of the learning curve will not be substantial. Then once they handle certain techniques, the macro lateral flash is a great contribution.

Lenses

Basically, macro lenses from 50 to 200mm in focal length are used for clinical photography. In the author’s experience, macro lenses of about 100 mm in focal length provide the ideal combination of magnification ability and convenience working distance for dental purposes. Teleconverters or zoom lenses can be used, but not recommended. The same goes for lenses with autofocus mode. If this is the case, the automatic mode must be switched off and put on manual. Focusing is done manually and moving the ring lens near a sharp image, and with small movements to and fro, achieves perfect focus. A high quality lens is paramount to capturing crisp and bright photos. This aspect should not be compromised. It is ideal to have a magnification ratio of 1:1. In the author’s experience a good lens to start off with at a reasonable cost is the Sigma 105mm f/2.8 EX DG macro (Figure 6), which is compatible with different brands of cameras. On the other hand, for the seasoned and professional photographer, who does not want to compromise quality, a Nikon micro lens and the AF-S 105mm f/2.8 ED, NC, VR (Figure 7), would be recommended, though costing more than doubled compared with the aforementioned Sigma.

Accessories

Retractors

To gain better access to the buccal cavity, better visualization of the structures of interest and that they are sufficiently illuminated, it is essential to have good lip retractors. They should neither be very uncomfortable for patients, should avoid reflections and ideally possess a certain capacity to stay in place and avoid having the dental assistant hold them, as is the case with Microhold type retractors (Figure 8). In the case of a Span- dex type (Figure 9) or soft latex retractors from boccal Vivadent OptraGlate (Figure 10), this does not happen and the picture can be taken without external help. Ideally, always choose the largest possible retractor for improved exposure of the structures of interest. The clinician can make the process less cumbersome by using petroleum jelly or cream on the patient’s lips before starting.

Mirrors

When taking pictures in posterior regions, mirrors are invaluable, since the angle of the buccal area doesn’t allow taking of direct photos. To avoid double images and to enhance the sharpness, quality mirrors are needed, ideally hologram. It is useful to have mirrors with long firm handles (Figures 11-15), in order to position your hands away from the objects of interest and avoid unwanted shadows. This is of particular importance when showing the use of materials or objects near to the teeth. To prevent the mirror missing up, they must be at a temperature similar to that of the oral cavity. For this effect you can use hot water or any type of air heater. You should also ask the patient to breathe through their nose. Another option is that the dental assistant gives a patient a neutral flow of air with the triple syringe. It is noteworthy that these mirrors are very sensitive with Miraclear, blinks, scratches or light reflections and ideally possess a light screen to be treated with great care by the staff.

Black background or contrastors

In the previous section, where the aim is to show the upper and lower teeth separately, the rest of the structures in the background can distract from what you want to highlight. To avoid this, we recommend the use of opaque black plates called contrastors, positioned behind the teeth you want to photograph. When used correctly, the quality of the picture is improved and the viewer can focus on the subject (Figures 14 and 15). Besides commercial products from brands like Anaxdent, Doctors’ eyes and Photonmed, different types of black plastic can also be used as long as they do not generate unwanted reflections. If you use material other than contrastors, it is important to use your preference consistently when photographing a series of photos. If you decide to cut the edges of the picture by using software such as Photoshop, it not only will not produce the same results, because cropping will increase the relative size of the pixels due to the magnification of the desired area, but will increase the time invested by the clinician producing good quality clinical photos.

Examples

In order to compliment intraoral photography, it is recommended to show pictures of patients before and after treatment. These types of photos, although may seem simple and easy to execute, can present difficulties. In Figure 16 and 17, you can see a badly taken picture, distracted by multiple folds such as inadequate background, shadowing on the right side, and an unfavourable facial expression, etc. In contrast, Figure 16 shows a clearer picture, a neutral background, no unwanted shadows, good lighting and a positive facial expression. The second aspect to show in most of the treatments is a buccal overview of the oral cavity, starting from the anterior teeth. In the Figure 18 and 19, you can see two examples of a photo, the first badly taken and second well taken. In this case, interest should focus on the anterior teeth that need treatment. Therefore, there is no point taking a picture showing lips, facial hair such as moustache’s, lip retractors and excessively showing gingiva. These structures only distract from what is really important.

It is also easy to make errors in lateral pictures, an example of this is Figure 20, which shows that, in addition to an underexposed image, the picture is dark, the angle is not right, you see the lips and the tip of the mirror. On the contrary Figure 21 is a better photo, having the proper exposure, no distracting elements and the correct angle was taken.

In the occlusal view, both mandibular and maxillary, one must keep direct views in mind. A good mandibular occlusal photo is far more difficult than the maxilla by several factors: Firstly, the tongue needs to be retracted, secondly, the patient must be instructed to open the mouth widely and thirdly, the angle of the photo.

In Figure 22 you notice, in addition to being inadequately illuminated, the axis of the arch is not centered with the photo, we can see the jaws and teeth as well as the edges of the mirror. In contrast, Figure 29 shows an image best achieved where the picture is centered, well lit, and comfortable and free of other distracting structures.

Case report

One of the main objectives of the documentation process, is to explain to patients or students what steps were performed to reach certain results. It is also beneficial to graphically present and compare new and already established techniques. The following is simple case of two composite restorations with sectional matrices and a centripetal layering technique combined with an exacting documentation and standardization that images should demonstrate.

Another objective of a systematized and detailed documentation is to have graphic material, either for patients to understand or for treatment results objectively, so they have no obscure treatment expectations. These types of aesthetically documented treatments will be discussed and presented with documented cases in a step by step manner in the next chapter of this series, in addition to discussing common mistakes and how to solve them.

About the author

Dr. Mauhn is a graduate from the University of Chile, School of Dentistry. He received the German DAIR in Munster, Westfalen Lippe one year later. The University College of Dentistry certified him as Implantologist in 2007. In 2008, he published his doctorate thesis in 2008 titled “Deseintegration of zirconia implants, an in vivo study” and got his doctorate degree in 2009.
Using Cone Beam (CBCT) in Implantology

By Dr Alexander Luke

Abstract: Cone beam computed tomography (CBCT) is a diagnostic imaging technology that has changed the way in which dental practitioners view the oral and maxillofacial region, teeth and the surrounding structures. CBCT is designed in such a way that 3D images are seen without distortion and superimposition which is similar to CT imaging. The advantages of CBCT are: simpler image acquisition, lower capital cost and less radiation dose to the patient.

Introduction
Radiographic examination is an important diagnostic tool in dental implants treatment planning. Information obtained from a conventional or a digital radiography is limited by the fact that the 3D anatomy of the area being imaged is compressed to a 2D image. The superimposition of structures is again a major limitation of the 2D image.

Cone Beam Computed Tomography (CBCT / CBVT) is a 3D x-ray imaging technology that exposes the patient to an x-ray beam in the form of a cone which is revolved around the patient. The benefit that this has over a CT scan is that a CBCT scan requires significantly reduced exposure times and so exposes the patient to significantly less x-ray radiation. However compared to a 2D x-ray there is still an increase in dose and so consideration is still required when recommending a 3D view. The European association of osseointegration (EAO) have given guidelines which states that cross sectional imaging is beneficial in preoperative assessment and treatment planning of dental implants and that should not be a regular protocol post operatively unless needed.

A CBCT scan captures multiple images (ranging from 150 to more than 600) in a single scan with fewer artifacts when compared to panoramic radiography.

3D Images are ideal for planning the placement of implants. As with all x-ray procedures CBCT carries a radiation exposure risk to the patient and so it is necessary to ensure that the dose is kept to a minimum and will provided optimum diagnostic information resulting in improved patient care.

CBCT collimates the x-ray beam to focus on the area of interest known as the field of view (FOV). It is advisable not to radiate outside of the area of interest so it is very important that the CBCT system offers a choice of FOVs ranging from small to medium to large allowing the user to select the optimum FOV for the treatment. This function may not be available in all CBCT units however it is essential so that the user can select the correct FOV for the treatment and more important has available a small Field of View (for example 5.5 x 5cm) which is in fact suitable for...
the majority of dental examinations. At this level the effective dose is small enough to increase those examinations that can be justified to have a CBCT scan.

CBCT images are isotropic with ranges from as low as 0.076 mm to 0.4 mm. The images in different planes and the multiplanar reformatted images had led to achieve the level of spatial resolution accurate in measurements such as in implants site assessment.

Indications for CBCT in implants
1. To assess the quantity and quality of the bone in the edentulous area.
2. The relationship of the implants to the neighbouring areas.
3. For the placement of implants in the desired area.
4. In designing a surgical guidance template.

Limitations of CBCT in implant planning
Crowns or metallic appliances in the mouth can cause artifacts of the 3D image. The metals causing artifacts can range from minimum to the extent that the image interpretation is difficult.

Conclusion
2D imaging has been serving the dental fraternity in their diagnosis and will continue to do in the future. The recent availability of 3D imaging using CBCT systems for treatment diagnosis and planning implant positioning gives the dentist more accurate information and improved patient care.

The Carestream CS 9000 3D has a FOV of 5 x 3.7 cm creating images with a resolution of 0.076 mm. This resolution is beneficial for accurately planning implants and overall improved treatment.

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- CAD/CAM: ready for enhanced capabilities and procedures


References
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Interview: Vanik Kaufmann explains the advantages of KaVo’s new ARCTICA CAD/CAM system

Not only has he the proprietor of the dental laboratory CeraTech in Liestal near Basel been a CAD/CAM user from the very beginning but he also has provided valuable input into the technology’s development through his active participation in it. Recently he has become the owner of KaVo’s new ARCTICA system. We wanted get his first impressions from working with the system.

Mr. Vanik Kaufmann: First of all there is the striped light scanner. I particularly like that it is a semi-automatic design. With fully automated systems I often encounter problems with cumbersome re-scans when the first scan was incomplete. Scans that require essentially no corrective work can be achieved with very little experience. In addition, it works extremely fast. And even in cases where the scan shows gaps the model can be repositioned accordingly, perhaps by tilting, and the software applies any subsequent corrections automatically.

And what are your experiences with the grinding unit? I really appreciate that it is a compact 5-axis system that not only uses blanks very economically but also that I am finally able to process metal, something that up until now was not possible with small systems.

Mr. Kaufmann, you recently started using KaVo’s ARCTICA CAD/CAM system. You have extensive experience with CAD/CAM systems. What do you consider to be ARCTICA’s particular advantages?

I really appreciate that it is a semi-automatic design. With fully automated systems I often encounter problems with cumbersome re-scans when the first scan was incomplete. Scans that require essentially no corrective work can be achieved with very little experience. In addition, it works extremely fast. And even in cases where the scan shows gaps the model can be repositioned accordingly, perhaps by tilting, and the software applies any subsequent corrections automatically.

What is zirconium dioxide still important nowadays? There are still dentists who request metal frameworks. When CrCo alloys are required, we have then externally made by selective laser sintering. When biocompatibility is required, it has to be titanium. We process a large number of titanium connecting bar and up until now had to have them fabricated externally.

Now we are able to do this in house and the design is simple and fast by means of the software provided.

How practical is the software? It is fantastically simple. E.g. during the design of an anterior bridge, the automatically proposed crown can be moved and rotated through key combinations which are considerably faster and simpler than with other solutions that require multiple key clicks. And its operation is intuitive to learn. Within half an hour of receiving it I was able to do a bar design without a hitch and without receiving any training. KaVo’s hotline with remote support is equally fantastic and useful especially in the early stages when one might have the occasional problem: These consultants are highly competent, they can log in remotely and point out mistakes on your own screen or give hints on how to do things even faster.

The multiCAD Software is equipped with open interfaces, but not every scanner supplier offers open interfaces. How much data transfer can you utilize? We are not only able to do this with manufacturiers that provide STL files but also with others who still believe in the advantages of proprietary systems. We are using Rhino’s dental shaper for this purpose; it can convert all relevant data sets to compatible STL files. You also use a printer (Solidscope).

Mr. Kaufmann, many thanks for this interview.
NEW: Philips Sonicare FlexCare Platinum

For outstanding cleaning, even deep between the teeth

Philips has the right sonic toothbrush for every cleaning need. The latest innovation is called Philips Sonicare FlexCare Platinum. Its innovative pressure sensor gives immediate feedback in a simple manner if too much pressure on the brush head minimizes the vibrations. This makes the Philips Sonicare FlexCare Platinum ideal for those of your patients who are worried about using too much pressure when cleaning with an electronic toothbrush. Nine individual settings and intensity levels thereby make adaptation to the individual cleaning requirements possible.

Pressure sensor
This innovative sensor gives simple and intuitive feedback if the brush head is pressed down too hard.

3 cleaning settings
• Clean – ensures optimal plaque removal (standard)
• White – removes discoloration of the tooth surface in 2 minutes, and the front teeth are whitened and polished in a further 30 seconds.
• GumCare – combines 2 minutes in the Clean setting with 1 minute of gentle gum massage for healthy gums.

3 intensity levels
Maximum comfort with the 3 adjustable intensity levels: low (for sensitive areas), medium and high. Each of the 3 intensity levels can be combined with each of the 3 cleaning settings.

Philips Sonicare InterCare brush head
Extra long filaments reach deep into the spaces between teeth and ensure an excellent plaque removal there compared to a manual toothbrush. For better tooth and gum health.

UV-Sanitizer
With the UV light technology from Philips, up to 99% of the bacteria and viruses on the brush head are rendered harmless – in only 10 minutes.

Lithium-ion rechargeable battery
With 3-week working life

1 E. coli, S. mutans and HSV1, HA
The Inman Aligner: A progressive approach to smile design - Part 2

By Dr Tif Qureshi

The following article is Part 2 in a series discussing the use of the Inman Aligner as a tool for minimally invasive cosmetic dentistry.¹ The first article (published in DTMEA Nov-Dec 2013) demonstrated that standalone treatments of patients are an alternative to both fixed braces, which are unsightly and have long treatment times; and to expensive clear aligner treatments in suitable cases. This article will demonstrate that patients who desire a more traditional smile makeover can achieve beautiful results in a more progressive manner that allows them to make their choices along the way. This often results in virtually no removal of tooth structure and a treatment result with the responsibility of decision-making shared between dentist and patient.

Moreover, the subject matter of this article could potentially start one of the most controversial debates in cosmetic dentistry for years. We are not only discussing a radically different approach to smile makeovers, but critically a sharply different approach to the traditional methods of planning smile design.

What would you choose? Patients entering cosmetic practices are often assessed at the initial consultation. They have digital photographs taken and perhaps study models are made. Normally, dental imaging software is used to show patients what can be achieved. These ingenious programs (see www.snapdental.com/AUST) can help patients realise what is possible. Naturally, care must always be taken when promising treatment results that are viewed digitally.

While computer imaging can be a very powerful tool to help the patient see the potential in his/her wish, I believe it also can make a patient focus on a certain prescribed goal that may not be the only way of satisfying his/her wishes. Dentists using imaging would ideally create a set of five to ten different outcomes of varying degrees of improvement to allow the patient to make a more informed decision. While ideal, it is not certain that dentists actually present different levels of treatment to their patients digitally. Even if they were able to see various images of their teeth, it can still be difficult for a patient to really see and feel the suggested changes in their mouth. One can question the ethics of allowing patients to commit to a potentially irreversible procedure based on 2-D photographs.

Three-dimensional wax-ups can also be very useful at this stage. If a patient is keen on the image, going to an additive wax-up can sometimes allow for a direct preview try-in using a silicone stent taken from set-up. Temporary material of variable shades can be tried in directly, without any bonding to allow the patient to see the proposed outline, form and overall aesthetics.

Despite this, veneers are often used to treat alignment issues and is very difficult for patients to appreciate the alignment of their own teeth with wax-up or imaging. By approaching these cases with a different protocol in mind, a dramatically less invasive treatment plan becomes evident.

“We are not only discussing a radically different approach to smile makeovers.”

The first step is to look at the patient’s tooth alignment. Mis-aligned teeth can cause issues in gum heights, line angles, light reflections, shades and tooth length. Correcting the misalignment first can create a completely different perception of the apparent problems. Next, the teeth should be bleached. This can be done either immediately after the teeth have been aligned or preferably simultaneously. After alignment and bleaching, edge bonding (we term this the ABB concept) should be offered to improve the incisal edge outline.

This combination of treatments also works well because the Inman Aligner is a removable appliance and only needs to be worn 16 to 18 hours a day. This means simultaneous bleaching is very possible and straightforward. A recent study from Sweden indicates a cost-benefit advantage of treating patients with removable appliances in general dental clinics, rather than with fixed appliances at specialist orthodontists.² The conclusion of this study is significant, since a popular choice amongst aesthetic dentists in the UK is removable orthodontics.

The cases outlined here highlight patients who, either at the start of treatment or for years, had originally wanted veneers and had a specific result in mind that only veneers could have offered quickly. They were all concerned about the degree of preparation required, so undertook alignment first. Then, part of the way through, started bleaching and very quickly changed their minds about what they wanted once they saw their own teeth improve.

Case 1 (Figures 1-8)

Laura was concerned about her very prominent central incisors. She wanted to have them straightened and had considered veneers. She had ruled out conventional orthodontics and invisible braces because she wanted a quick treatment and did not want anything stuck to her teeth, which is the reason that she had refrained from orthodontic treatment. Several years ago, she may well have had veneers placed.

On viewing her teeth before the occlusal photograph, it was quite clear that this would have involved massive preparation of the upper teeth.

Figure 1. Smile view before treatment.
Figure 2. Occlusal view before.
Figure 3. Close up view before.
Figure 4. Close view after Inman Aligner and whitening at week 9.
Figure 5. Close view after ABB at week 9.
Figure 6. Smile view after 9 weeks.
Figure 7. Occlusal view after.
Figure 8. Full face view after.

¹ The Inman Aligner: A progressive approach to smile design - Part 1
² The Conclusi of this study is significant, since a popular choice amongst aesthetic dentists in the UK is removable orthodontics.
central teeth. Preparation would have been well into dentine and may have even involved elective endodontics. Her lateral teeth would have needed little preparation, but the emergence profiles would have been poor, creating unrealistic aesthetics and a possible periodontal risk later on. Instead, the alignment was completed with an Inman Aligner in ten weeks. Her treatment sequence is detailed below.

BACD-style digital photographs were taken and the amount of crowding was calculated using an electronic crowding calculator, which can also be done by arch evaluation of the patient’s study models. We measured the ideal curve and subtracted this measurement from the total mesio-distal widths of the teeth being moved. The results showed that there was only 1.6 mm crowding. This seemed less than one would have expected; the reason for this was that because the laterals were being pushed out, the arch was being expanded, thus creating space. It was clear from the photographs that despite the obvious crowding, there was some less obvious irregular tooth wear. It was important to indicate this to the patient, as this would become more evident once the misalignment had been corrected. The patient was quoted for three incisal composite tips. She opted for an Inman Aligner with an incorporated expander. These expanders are a very handy way of creating extra space either to treat cases that are more complex or to use instead of performing interproximal reduction (IPR).

In this case, no IPR was performed. We planned to get nearly all space by using the midline expander. The patient was instructed to turn the midline screw once a week after one week of wear. Each turn is a quarter of a revolution and equates to 0.25 mm. At week six, bleaching was started with soft rubber sealed trays. After nine weeks, the patient had expanded 1.8 mm and her teeth were in alignment (As a rule, less than 2.5 mm expansion with an incorporated expander is easily tolerated). Looking at her post-alignment result, the golden proportion, gingival heights and axial-inclinations had improved dramatically, all without a handpiece being picked up and in the space of nine weeks. What was very clear to the patient at this point was that she only needed some simple bonding to improve the incisal edge outlines. Without the use of an anaesthetic, the edge outlines were prepared with very slight roughening of the edge, bonding of hybrid composite on the load bearing edge and a microfill on the facial surface. The edges were then polished.

The patient was thrilled with the result we achieved using an Inman Aligner and some simple bonding. She described that when she had once considered having veneers, she had hoped for a similar result. There are still minor imperfections, but, in my opinion, these contribute to her natural beauty. There is a stark contrast between the treatment selected and the potential treatment approaches in this case. Where once a patient, who refused orthodontics, would have consented and received highly aggressive tooth preparations to achieve correct alignment with veneers, now a removable aligner and some simple bonding were able to achieve a similar and arguably better result in less than three months with not a micrometer of tooth reduction needed.

**Case 2** (Figures 9-17)

This young lady had been attending my practice for some time and was aware of porcelain veneers, having seen our previously advertised cases. We had spoken about the aesthetic benefits of veneers years before. However, on reviewing her case, it was clear that we could improve her alignment dramatically with an Inman Aligner in a short period.

We took an occlusal image of her anterior teeth and outlined the amount of tooth structure that would have to be removed to produce veneers that would look aesthetic. It was immediately apparent to the patient that alignment of her teeth would offer a possibly better treatment outcome. Her case was suitable for an Inman Aligner and as only 2.5 mm crowding was present, this meant it could be treated quickly and simply. Her Inman Aligner was fitted and IPR performed progressively over three visits. At week eight, upper and lower bleaching trays were constructed even though her alignment was not yet complete. Home whitening was begun with clear and concise instructions. We used rubber trays with a deep seal cut into the model to create a tight dam effect. Over two weeks, her teeth whitened nicely and at week ten, she returned for a review.

Interestingly, the patient's perception of her smile had changed dramatically. Owing to the improved line angles, whiter teeth and balanced gum heights, her eyes were now only drawn to the irregular outline caused by chipping and differential wear.

The patient then enquired about fixing the edges. We offered to bond the incisal edge with virtually no preparation. A hybrid composite (Tetric Flow, Ivoclar Vivadent) was placed palatally and incisally with a microfill on the facial surface. This was done in 80 and 81 shades to match the bleaching. The patient was delighted with the result and a wire retainer was bonded immediately.

Despite some clear deviations from her ideal simulated smile, the patient explained that she felt her smile after alignment was better than she had imagined. Her veneers would have been. Had veneers been placed, we could perhaps have corrected the golden proportion more fully, balanced the zonation, improved the canine outlines, widened the buccal corridors, etc. However, that was clearly not what the patient desired. Should she later decide that she does need further improvements, she can proceed with already straightened teeth. The ARB smile design is progressive and not subject to wear. In this manner, the patient is given the opportunity for decision-making in his/her treatment and the responsibility in choice is shared.
This patient presented with a “wonky smile”. She had previously looked into the possibility of having porcelain veneers placed but came to understand some of the aims of smile design. However, on studying her teeth, it became clear that there was potential to pre-align first. Her upper right central was mesially rotated by approximately 9° and her laterals were slightly in-standing and mesially inclined. Furthermore, she had fairly stained teeth, with the canines two shades darker than the centrals.

On examining the occlusal view, the patient became aware of the extent of aggressive tooth preparation that would be required to place a veneer. She understood that her teeth needed to be aligned first before we decided on the next step in design. An Inman Aligner was used over the period of eleven weeks to de-rotate the front tooth and to tip out the laterals. At week eight, bleaching was commenced. After two weeks later, it was especially nice to retain the natural aesthetic characteristics of this patient. Ceramic work, as beautiful as it can be, would certainly have changed her appearance more – some may say for the better, but that was not what the patient actually wanted. She wanted her own teeth to have correct length and look straighter and whiter.

Process of placement

For placement of the incisal edges at week twelve, no local anaesthetic was administered. Other than slight roughening of the worn incisal edges of the upper left 1 and 2, no other preparations were needed. A tetric hybrid composite (Tetric Flow, Ivoclar Vivadent) was built up free-hand on the incisal edge and palatal surface to match the outline of the other central. A small amount of white opaque was dotted in to match the facial surface and was simply filled with a nano-hybrid composite (Venus Diamond, Heraeus) for high polish. The composite was placed vertically using rubber sticks (ProTaper, DENTSPLY DeTrey) to try to blend in with surface anatomy to mask the join. The process was repeated on the lateral.

The patient was held in retention using her aligner and an impression was taken for a wire retainer to be fitted two weeks later. It was especially nice to retain the natural aesthetic characteristics of this patient. Ceramic work, as beautiful as it can be, would certainly have changed her appearance more – some may say for the better, but that was not what the patient actually wanted. She wanted her own teeth to have correct length and look straighter and whiter.

Shared responsibility of treatment

The ABB concept can truly be described as minimally invasive. At the same time, it actively involves the patient in the treatment, giving him/her a feeling of being in control and taking responsibility for his/her treatment. This has been proven to be of great significance when measuring patient satisfaction of treatment results. There are many anecdotal stories about patients who had technically beautiful veneers placed but found that these simply did not meet their desires. The problem is that even with no-preparation veneers, an irreversible procedure has been undertaken and this has been done mainly based upon the treating dentist’s opinion, with the patient having very little input.

In my experience, every patient that I have treated according to the ABB concept has accepted the result happily, even though technically it might not be perfect from a smile design point of view. Nowadays, with rising levels of litigation, one would have to question the wisdom of selecting a treatment path that could result in conflict over one in which the patient participates in key decisions and sees his/her own teeth improve.

Conclusion

I understand the controversy in challenging the traditional approach to smile design, but with new mainstream progress in minimally invasive treatment, a smile design visual is vital when we are looking to give our patients what they actually want. Previously, we whitening was always a way of aligning patients to an alternative vision of their teeth. Now, and more significantly with alignment techniques, patients can make their own decisions and massively reduce the risks by breaking down the process of a smile makeover into stages and reassessing at each point.

With ABB, it is possible to align, whiten and bond a case in less than twelve weeks, which previously might have required eight to ten veneers, four times the cost and significant tooth preparation. Thus, a dramatic contrast in pathways has been created. If a patient is happy after alignment, whitening and minimal bonding, then this has to be viewed as a success. This UK technique is now a significant new treatment discipline in its own right and cosmetic dentistry will be better for it. After all, what would you choose to have?

Contact Information

Dr. Tiff Qureshi is the Past President of the BACD. He presents hands on courses and lectures on the Inman Aligner worldwide.

For information on courses please go to: www.inmanalignertraining.com or contact Caroline Cross on Tel: +44 085 366 5477

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Case 5 (Figures 18-20)

This patient presented with what she described as a “wonky smile”. She had previously looked into the possibility of having porcelain veneers placed but came to understand some of the aims of smile design. However, on studying her teeth, it became clear that there was potential to pre-align first. Her upper right central was mesially rotated by approximately 9° and her laterals were slightly in-standing and mesially inclined. Furthermore, she had fairly stained teeth, with the canines two shades darker than the centrals.

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Case presentation: OptiBond™ XTR

By Claude Finelle

This 85-year-old patient, who was in good health, came for a consultation to “improve his smile”.

This was motivated by jokes made by his grandchildren about the condition of his teeth. Primarily, the 6 anterior maxillary teeth were involved. There was no particular request to light his smile.

During the first consultation, the clinical examination revealed the presence of numerous cervical lesions, as well as fractures of the incisive edges of 11 and 21.

The above-mentioned fractures of the free edges of the central incisors, the presence of a carious lesion on the mesial surface of 11, an old composite on the mesial surface of 21 and the patient’s complaint about the elongation of the two centrals led us to opt for two all-ceramic e.max crowns made of feldspathic ceramic reinforced with lithium disilicate. Taking into account the patient’s age, this therapeutic choice was not hindered by the proximity of a high volume of pulp.

We selected e.max in the hope of achieving better aesthetic integration, with its translucence allowing the saturated and natural appearance of the underlying preparations to show through.

This type of all-ceramic restoration allows us to take advantage of bonding, which appeared to us to be the best solution on the vital teeth. (We used the bonding agent to seal the dentinal tubules and improve the sealing of the cervical limits.)

We remedied the cervical wear on all of the teeth, including the central incisors (from 14 to 25). For this treatment, we used OptiBond™ XTR, a two-step, self-etching adhesive system (SAM2), and Miris composite in shade S6.

The central incisors were then prepared by cutting back the preparation or initial priming. The adhesive treatment was carried out with optical assistance (magnification X 2.5) and the limits were juxtapositional.

An impression of the 2 preparations was made during the same appointment. One week later, the two crowns, made by LNT laboratory in Paris, were delivered to the practice. They were tried in and then etched with 5% hydrofluoric acid for 20 seconds. Once the acid had been neutralised and the surface carefully dried, a layer of OptiBond XTR universal adhesive (bottle no. 2) was applied to the restorations’ internal surface shortly before application of the adhesive.

The advantage of OptiBond XTR is its ability to adhere to all types of prosthetic substrates without preparation or initial priming. This allowed us to perform our bonding procedures more efficiently, dealing with both restorations at the same time regardless of the prosthetic material. The adhesive treatment of the preparations was carried out with the same OptiBond XTR and, in this case, we applied a first layer of the primer, Optibond XTR Primer (bottle no. 1), which was brushed onto the enamel and the dentine for 20 seconds and then dried for 5 seconds. We were careful to dip the brush in several times during the application process, to ensure fresh acid was being brought into contact with the dentinal surfaces each time and to optimise etching.

Before applying OptiBond XTR Adhesive (bottle no. 2), we were careful to shake the bottle lightly to ensure homogeneity.

OptiBond XTR and NX3
The perfect combination

OptiBond XTR and NX3 are so good, you can use both in total dark cure without any additional self-cure activator. The combination of OptiBond XTR + NX3 Automic cement demonstrated better indirect dentin bond strength to the MultiLink Cementation System.

Study performed by State University New York, Buffalo.
Two phase treatment of a Class II division 1 patient complicated by traumatic upper incisor intrusion: A Case Report

By Dr. Roelien Stapelberg

Phase I

A female patient presented at the age of 7 years and 8 months with the complaint that one of her upper teeth were absent. She had a mild thumb sucking habit with a tongue thrust. She had a Class II division 1 incisor relationship on a Class II skeletal base with mildly decreased vertical facial proportions.

Extraoral examination (Figure 1a-c)

Extra-orally the patient presented with a Class II skeletal pattern convex profile and accentuated labiobuccal fold. She had acceptable vertical facial proportions. The frontal examination revealed acceptable facial symmetry and balance, with the upper midline coincident with the midsagittal axis. Soft tissue examination demonstrated thin upper and lower lips with mild incompetence, as well as an acute nasolabial angle. The lower lip was retrusive to Ricketts E-line.

Intraoral examination (Figure 1d-h)

The patient was in the early mixed dentition and had good oral hygiene. There was no history of dental caries, and no active dental caries. Mild generalized extrinsic staining was present. Furthermore there were no restorations present. The maxillary arch was symmetric and tapered, whereas the mandibular arch was square and symmetric. Both arches had no space deficiency and had well aligned buccal segments. The upper right central incisor was missing, and the upper left central incisor was procurred.

In occlusion, the overjet measured 10mm, with no overbite present. The molar relationship was left full Class II, and the right side was ⅔ Class II. The lower centerline was 2mm to the left of the upper centerline, which was coincident with the facial centerline. There was no crossbites or displacements.

The Dental Health Component (DHC) of the Index of Orthodontic Treatment Need (IOTN) was 5l, and the Aesthetic Component (AC) was 9.

Radiographic examination (Figure 2a,b)

The DPT demonstrated that all second molars were present and developing, as well as the lower third molars. The upper right central incisor seemed to be horizontally impacted. The cephalometric analysis confirmed our clinical findings of a Class II skeletal pattern with an ANB of 7°. The Wits appraisal affirmed the Class II skeletal pattern with a measurement of 7.5 mm. The vertical proportions were slightly decreased, demonstrated by the maxillary-mandibular plane angle of 89.7° and face height ratio of 52.1%. The upper incisors were severely proclined at 128.5°, as was the lower incisors at 106.0°. The lower incisors were retruded relative to the upper incisors line with a measurement of -0.8mm.

Problem list

1. UR1 Horizontally impacted
2. Class II skeletal pattern due to mandibular retrognathia
3. Convex profile
4. Increased overjet
5. Lower centreline 2mm to the left of the upper centreline
6. Missed tooth
7. Establish coincident centerlines
8. Maintain result until comprehensive orthodontic treatment

Treatment plan

1. Upper hybrid TPA - tongue crib appliance to assist in breaking the thumb sucking habit and relieve the present tongue thrust, while reinforcing the anchorage of the UR1 and UL1.
2. Upper 2x4 pre-adjusted edge-wise fixed appliances (0.022” x 0.028” slot) with MBT prescription. Surgical treatment and filling of the dentin around the root were performed using the NITI open coil spring technique. The appliance was ligated in place and an upper fixed retainer from UR1 – UL1 was placed.

When the position of the UR1 was at an adequate level, it was engaged on the 0.016 SS with an elastomeric tie. The time period from surgical exposure of the UR1 to alignment with the archwire was 5 months. The treatment was deemed complete when an appropriate bonding matretial, enabled us to place several cer-

vical composites, as well as two crowns, helping this patient to smile at his grandchildren without fear of being teased.

About the author

Claude Finelle
Graduated in 1975 (Paris University V) Former university lecturer at the Faculty of Dental Surgery Paris V, thesis section.

Creation, in 1992, with Prof. Maurice Minsou (Head of Plastic and Reconstruc-
tive Surgery Service), of the “Smile Consultation”, currently in place in St Louis Hospital, Paris.

Member in 1993, then Fellow of the “American Society for Dental Aesthetics”.

Author of numerous conferences and articles, in France and abroad, and presenta-
tions of articles and videos on professional internet sites.

mental exposure of the UR1 via the open technique with bonding.

Retention via a bonded upper fixed retainer UR1 to UL1 was placed until Phase II treatment. The patient was kept in retention and followed up frequently to establish the beginning of the adolescent growth spurt, in order to initiate phase II.

Phase II

A female patient presented at 9 years 4 months of age for a retention check of her fixed upper retainer, still in place from her previous orthodontic treatment (Phase I). She had a Class II division I malocclusion, on Class II skeletal bases, with decreased vertical proportions, bimaxillary protrusion and a lower lip trap.

Extra-oral examination

Extra-orally the patient had a severe Class II skeletal pattern with a convex profile and acceptable vertical proportions of the face. Frontal examination revealed no transverse asymmetry, and the upper centerline was on with the midfacial axis, with lower centerline being shifted 2mm to the left. Soft tissue examination demonstrated a retruded and incompetent lower lip of normal thickness. A lower lip trap was also present.

Intra-oral examination

The patient was in the late mixed dentition and had good oral hygiene. There were no restorations, and the patient was caries free. The maxillary arch was oval and symmetrical with no space discrepancy. The buccal segments were well aligned, with mesial buccal rotation on the UR6 and UL6 present. The mandibular arch with oval and symmetrical with no space discrepancy, with a deep curve of Spee present. The buccal segments of the lower arch was well aligned.

In occlusion the overjet measured 8.5mm, with an overbite of 3.5mm (50%). The left molar relationship was ½ unit Class II, and the right ½ unit Class II. The left canine relationship was full unit Class II, and the right was ½ unit Class II. No crossbites were present. The dental health component (DHC) of the Index of Orthodontic Treatment Need (IOTN) was 4a, and the aesthetic component (AC) was 9.

Radiographic examination

The DPT demonstrated that all third and second molars were developing. No other abnormalities were found.

The cephalometric analysis (Table I) confirmed a skeletal Class II anteroposterior discrepancy as demonstrated by an ANB of 5.8° and a Wits appraisal of 6.5mm. Both the upper and the lower incisors were severely proclined (134.7° upper & 104.5° lower), with the lower incisor in a relative normal position in relation to APo line (0.6 mm).

Problem list

1. Class II skeletal relationship due to mandibular retrognathism
2. Convex profile with reduced lower lip protrusion
3. Upper incisor proclination
4. Overjet of 8.5mm
5. Asymmetric Class II molar and canine relationship
6. 2 mm lower centerline discrepancy to the left of the upper dental midline
7. Incompetent lips at rest

Aims and Objectives

1. Utilize favorable mandibular growth for improvement of the Class II skeletal discrepancy
2. Improve facial harmony and increase lower lip protrusion
3. Reduce upper incisor proclination
4. Reduce overjet to normal values
5. Establish optimal buccal segment interdigitation bilaterally
6. Establish coincident centerlines
7. Obtain lip competence at rest
8. Maintain incisor display on smiling
9. Place teeth in a position conducive to favorable facial and dental esthetics and long-term stability
10. Retain corrected result

Treatment plan

1. Upper removable appliance while waiting for eruption of the upper second premolars and the growth spurt to occur. Appliance manufactured with an expansion screw to establish adequate maxillary dentofacial width to accomplish mandibular forward posturing without occlusal interferences from a crossbite tendency, with a z-spring on the 12 to obtain initial alignment.
2. Andreason's Activator appliance for mandibular growth stimulation with wax bite of approximately 5mm was given after the growth spurt was reached as evaluated by clinical examination. Capping of lower incisors was done on the Activator to minimize lower incisor proclination.
3. Full upper and lower pre-adjusted edgewise fixed appliances (0.022" x 0.028" slot) with MBT prescription was placed after Class I canine was achieved with the Activator.
4. Bonded upper fixed retainer individually from UR5 to UL5 and upper vacuum formed retainer to be worn at night time only and a bonded lower fixed retainer individually from LR5 to LL5.

Treatment progression

Compliance was excellent with the upper removable appliance and expansion attained was sufficient to prevent crossbite occurrence when the mandible was posture forward into a Class I canine relationship. After the growth spurt was attained, an Activator appliance was manufactured with forward posturing into...
Class I canine relationship bilaterally and a waxbite thickness of 5mm (Figure 5). The compliance with the Activator was excellent, and after 5 months of wear the patient was ready for fixed appliances. A cephalogram after the Activator treatment was taken and analyzed (Figure 6). The cephalometric analysis (Table 2) revealed a skeletal Class I anteroposterior relationship (ANB 3.6°, Wits appraisal 2.8 mm). The SNA reduced during the use of the Activator, which was the cause for the reduction in the ANB angle. The SNB remained almost the same. The vertical proportions indicated a mildly anterior growth rotation. The upper incisors retroclined, and the lower incisors proclined after the Activator use. The upper incisors were severely proclined with 120.0°, and the lower incisors as well with 111.3°. The lower incisors protruded in relation to APo (5.2mm). 0.022 slot preadjusted edgewise fixed appliances were placed, with the leveling and aligning phase initiated with 0.016" heat activated NiTi archwires in the upper and lower arches. The archwires progressed to 0.019 x 0.025" heat activated NiTi in the upper and lower arches, followed by customized and coordinated 0.019 x 0.025" stainless steel archwires with steel ligatures. At this stage the patient was advised to use Class II intermaxillary elastics (5/16" 3oz) bilaterally full time to correct our canine relationship after mild relapse occurred during the alignment and leveling phase of the fixed appliances. The intermaxillary elastics were continued for 4 months. During the torque expression of the rectangular steel wires, mild spaces opened in the upper arch, these spaces were closed with friction mechanics utilizing a closed elastomeric chain.

THE REAL CHOICE)
for pediatric dentistry

> Page 24
PRECISION CLEAN BRUSH HEAD PROVIDES

UP TO 5x

GREATER REDUCTION
IN PLAQUE BIOFILM ALONG THE GUMLINE

5x

* vs. a regular manual toothbrush

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Specially Designed with 7 Benefits*

All-round care for dentine hypersensitivity patients*1-6

We are constantly evolving our specialist range to meet the differing needs of dentine hypersensitivity patients. That’s why we developed Sensodyne® Complete Protection.

SENSITIVITY  ENAMEL  CLEAN  GUMS  FRESH  PLAQUE  WHITENING

*With twice daily brushing

1 denture

Everyday, day after day, your patient’s denture will have to support thousands of tasks. So it’s little wonder that even people with well-fitting dentures will have problems with trapped food, fear their denture will dislodge or a concern about bad breath.

This is where a Daily Denture Care Regime from Corega fits in

**Corega adhesive**
- Proven to improve bite force by 38% in well-fitting dentures,1 which improves your patient’s ability to eat difficult foods
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**Corega cleanser**
- Proven to manage denture hygiene effectively* and prevents bacteria from offending at the dentures
- Reduces plaque build-up with proven1 antibiotic activity and antifungal activity5

---

1 denture care regime

By recommending a Daily Denture Care Regime to your patients with dentures, you can be assured that you are helping to improve their comfort and confidence every day, day after day.

---

*When used as directed. ‘In vitro

A cephalogram was taken after the patient for the possibility of extractions. The upper incisors were proclined, as was the lower incisors, however the lower incisors did not procline more than the pre-treatment value, and the facial appearance accepted the increased proclination. Therefore no extractions were done to decrease the incisor proclination.

Finishing and detailing was done on a 0.016 stainless steel wire. The estimated treatment time for Case 1 treatment was 24-50 months. The actual treatment time was 22 months. Retention was initiated with an upper vacuum formed retainer and a lower fixed 3-5 retainer.

Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-treatment cephalometric analysis</th>
<th>Normal</th>
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<tbody>
<tr>
<td>SNA (°)</td>
<td>82 (SD 3)</td>
<td>79 (SD 3)</td>
</tr>
<tr>
<td>SNS (°)</td>
<td>75 (SD 3)</td>
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<tr>
<td>ANB (°)</td>
<td>3 (SD 1)</td>
<td>3 (SD 1)</td>
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<td>SN to mandibular plane angle (°)</td>
<td>8 (SD 3)</td>
<td>8 (SD 3)</td>
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<td>13.6*</td>
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<tr>
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</tr>
<tr>
<td>Interincisal angle (°)</td>
<td>140.5*</td>
<td>140.5*</td>
</tr>
<tr>
<td>Maxillary mandibular plane angle (°)</td>
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<td>159.7*</td>
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<tr>
<td>Lower anterior face height (mm)</td>
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<td>Face height ratio (%)</td>
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<td>50.4%</td>
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<tr>
<td>Lower incisor to APo line (mm)</td>
<td>0.6 mm</td>
<td>0 (SD 2)</td>
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<tr>
<td>Lower lip to Hicks E Plane (mm)</td>
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Table 2

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<th>Mid-treatment cephalometric analysis</th>
<th>Post-finish cephalometric analysis</th>
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<tr>
<td>ANB (°)</td>
<td>5.8</td>
<td>3 (SD 1)</td>
<td>5.8 (SD 1)</td>
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<tr>
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<td>12.6*</td>
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Invisalign®: clear benefits for your patients

By Vicki Vassalaki BDSSc
MDSc.

S
ince the launch of the revolutionary Invisalign orthodontic system in 1999, the removable, computer activated, aesthetic Invisalign® aligner has gained popularity world-wide as an alternative to traditional fixed appliances. Invisalign® provides adult and teen patients an aesthetic, non-invasive and precisely activated treatment alternative for improving smile aesthetics and occlusal requirements from minor alignment to complex malocclusions. Currently Invisalign® is available to patients in over 60 countries, with over 43,000 clinicians trained to use the product and over 2.8 million patients treated or in treatment. (1,2)

Due in part to the digital occlusal data from millions of treated patients, Align Technology Inc. (the manufacturer of Invisalign®) has been able to continuously support rapid innovation. Some improvements include interactive ClinCheck® software features, new FDA approved aligner materials, algorithm based features such as optimized attachments, specifically engineered to the tooth's shape, size and requested movement (Figure 1), hooks and cut outs for applying Class II and Class III mechanics, power ridges for assisting expression of root torque and eruption pontics for treating late mixed dentition patients. (3,4)

In February 2014, the new generation of custom engineered aligners were manufactured to fulfill the occlusal goals. A new lower PVS was taken to capture the clinical result and intraoral radiographs (Invisalign® finishing). Most of the treatment goals were fulfilled, except the complete rotation of the lower right canine. (Figures 7 & 8)

Tooth movement animation may be used by colleagues in multi-disciplinary planning.

Summary
The Invisalign® system has many unique benefits to offer both patients and clinicians. Its distinct 3D ClinCheck® software not only provides a valuable planning tool but it directly programs the activation of the aligners, allowing for the first time, aligners designed with multiple small and precise tooth activations engineered to move complex occlusal and dental anomalies. The scope of related research conducted by the manufacturer as well as by the private dental and academic communities is unique to Invisalign®, and offers significant scientific value to users, with over 500 publications and case reports around the globe. As a result, the Invisalign® system has continually evolved to become a predictable orthodontic appliance applicable to all categories of malocclusion, including extraction and surgical treatments (9), depending largely on the treating doctor’s level of experience using Invisalign®.

For this patient, the benefits of Invisalign® ClinCheck® software planning (Table 1) with the ability to superimpose and view degree of movement and to have the ability to program small, precise activation in the aligners made treatment predictable in terms of vertical control and preserving periodontal health. (10) In this case, the patient would not consider a surgical option and there was no obvious functional aetiology for the open bite. Post treatment stability, even of open bite patients and incidence of root re absorption have been found to be favorable with the Invisalign system. (10)

Table 1: Advantages of ClinCheck® Software

3D visualization of each planned movement, including treatment duration for clinicians and patients.

Accurate crown and generic root programming and assessment of movement.

Interactive tools to design mechanics such as attachment choice, Class II and Class III correction features.

Clinical tool for treatment monitoring and motivation enhancement.

Tooth movement animation may be used by colleagues in multi-disciplinary planning.

Table 2: Advantages of ClinCheck®

- Accurate crown and generic root programming and assessment.
- Interactive tools to design mechanics such as attachment choice, Class II and Class III correction features.
- Clinical tool for treatment monitoring and motivation enhancement.
- Tooth movement animation may be used by colleagues in multi-disciplinary planning.

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About the author

Dr. Vicki Vlaskalic is a practicing orthodontist in Melbourne, Australia and Clinical Instructor at the University of Melbourne, Department of Orthodontics. She has worked with the Invisalign System since the initial feasibility study in 1997 at the University of the Pacific, San Francisco, working as Assistant Professor in the Department of Orthodontics under Professor Robert Boyd.
Periodontitis, Diabetes and Smoking

By Drs. Khawla Al Matsroushi, Dr. Shatha Al Khatri and Professor Crawford Bain, Dubai School of Dental Medicine

Periodontal diseases have, for a half of a century, been known to be initiated by the accumulation of bacterial plaque. It has however been increasingly apparent in the current era that intrinsic and extrinsic risk factors influence the progression of periodontitis. Of these the most important are Diabetes and Smoking. Since both of these factors are common in the UAE this is of particular importance to UAE dentists. It is the purpose of this paper to review the current association between these risk factors and periodontal disease and to discuss the likely bi-directional relationship between management of periodontitis and the health of the diabetic patient.

Periodontitis and Diabetes

Diabetes mellitus occurs when the level of sugar (glucose) in the blood becomes higher than normal. There are two main types of diabetes. In type 1 diabetes the body stops making insulin and the blood sugar (glucose) level becomes very high (R). Type 2 diabetes, also called adult-onset diabetes and non-insulin-dependent diabetes, is a chronic condition caused by high levels of glucose (sugar) in the blood. Although some people can overcome the symptoms by losing weight and following a healthy diet and exercise plan, most people with type 2 diabetes will have it for life (R).

Both diabetes and periodontitis are chronic diseases. Diabetes has many adverse effects on the periodontium, and conversely periodontitis may have deleterious effects further aggravating the condition. The potential common pathophysiologic pathways include those associated with inflammation, altered host responses, altered tissue homeostasis, and insulin resistance. A recent study also showed that scaling, polishing and root planning of the periodontium can lower blood sugar levels potentially offering a practical means of reducing the numbers who develop full type 2 diabetes (R).

Diabetes has many adverse effects on the periodontium, including decreased collagen turnover, impaired neutrophil function, and increased bacterial destruction. Neutrophil chemotaxis and phagocytic activities are compromised in diabetic patients, which can lead to reduced bacterial killing and enhanced periodontal destruction. Inflammation is exaggerated in the presence of diabetes, insulin resistance, and hyperglycemia (R).

Neelima et al (R) examined 1500 diabetic patients; the prevalence of periodontal disease in these patients was 86.8%, significantly higher than the general population. By the early 1990s periodontitis was referred to as the "sixth complication of diabetes", and in 2005 the ADA formally acknowledged that periodontal disease is more often found in diabetics (R). Epstein (R) demonstrated that essentially all the aspects of bone growth and mineralization are diminished in the absence of insulin i.e. hyperglycemia. Vascular changes also increase with increase in blood glucose levels (Oliver and Tervonen) (R).

Peri-dontitis and Smoking

Second to bacterial plaque, smoking is the strongest of the modifiable risk factors for periodontal disease. Smokers harbor a higher prevalence of potential periodontal pathogens, and smoking impairs various aspects of immune responses, including neutrophil function, antibody production, fibrinolysis activities, vascular factors and inflammatory mediator production.

In smokers inflammation in response to plaque accumulation is reduced compared with nonsmokers and smokers have a decreased expression of gingival inflammation and bleeding on probing in the presence of plaque accumulation when compared with nonsmokers (R).

Smoking has been associated with a two- to eight-fold increased risk for periodontal attachment and/or bone loss, depending on the definition of disease severity and smoking dose.

One of the largest epidemiological studies reporting an association between smoking and periodontitis included 12,329 U.S. adults 20 years and older. In this study, current smokers were four times as likely to have periodontitis compared to nonsmokers after adjusting for age, race ethnicity, income, and educational level. Heavy smokers (≥ 31 cigarettes per day) using a stricter definition of periodontitis (mean whole mouth attachment loss of ≥ 4 mm), the adjusted odds ratio was increased to 25.64 among smokers aged 50 years or more (R). Longitudinal studies have demonstrated that young individuals smoking more than 15 cigarettes per day showed the highest risk for tooth loss (R).

Smokers have a greater extent of colonization by periodontal pathogens than nonsmokers or former smokers particularly at shallow sites (pocket depth ≥ 4 mm) with no differences between smokers, former smokers, and nonsmokers in pockets ≥ 4 mm. This colonization, along with low gingival blood flow may lead to an increased prevalence of periodontal breakdown.

Smoking exerts a major effect on the protective elements of the immune response, resulting in an increase in the extent and severity of periodontal destruction. Neutrophils obtained from peripheral blood or saliva of smokers, have been shown to demonstrate functional alterations in chemotaxis, phagocytosis, and the oxidative burst. Smoking has been shown to impair the chemotaxis and phagocytosis of neutrophils obtained from the oral cavities, and in vitro studies of the effects of tobacco products on neutrophils have showed detrimental effects on cell movement and the oxidative burst (R).

Discussion

Both diabetes and smoking are increasing in the UAE particularly in younger individuals. Since scaling, polishing and root planning have been shown to lower blood sugar levels, and since smoking cessation improves the periodontal condition in many of these patients, it is the responsibility of all dental professionals to provide comprehensive periodontal care for all diabetics and pre-diabetics, and to provide accurate smoking cessation advice with appropriate referrals as indicated. The situation can be complicated when a diabetic also has a smoking habit.

The relationships between Periodontitis, Diabetes and Smoking are major areas of research interest at Dubai School of Dental Medicine.

About the author

Drs. Khawla Al Matsroushi and Shatha Al Khatri are first-year residents at the Dubai School of Dental Medicine (DSDM) Periodontics MSc programme located in Dubai Healthcare City (DHCIC). Dr. Crawford Bain is Professor of Periodontology, and Director of the MSc in Periodontology at Dubai School of Dental Medicine (DSMM) located in Dubai Healthcare City (DHCIC).

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Dubai School of Dental Medicine, Dubai Healthcare City, Building 4. Dubai, United Arab Emirates
Get to Know the IFDH

The International Federation of Dental Hygienists (IFDH) is an organization designed to represent the interests of dental hygienists worldwide. Originally founded in 1975 by the International Liaison Committee on Dental Hygiene, the organization was formalized in 1986 in Oslo, Norway. Since that time, the IFDH has functioned as an international, non-governmental, non-profit organization that unites dental hygiene associations from around the world in the common cause of promoting oral health.

The purposes of the IFDH include the following:
- Safeguard and defend the interests of the profession of dental hygiene worldwide and advance the profession of dental hygiene.
- Promote professional alliances with its associations members as well as with other associations, federations and organizations whose objectives are similar.
- Promote and coordinate the exchange of knowledge and information about the profession, its education, and its practice.
- Promote access to quality preventive oral health services.
- Increase public awareness that oral disease can be prevented through proven regimens.
- Support and encourage research to understanding and discussion of issues pertaining to dental hygiene.
- Currently, the IFDH consists of 26 member countries. These include: Australia, Austria, Canada, Denmark, Fiji, Finland, Germany, Ireland, Israel, Italy, Japan, Korea, Latvia, Nepal, Netherlands, New Zealand, Norway, Portugal, Russia, Slovak Republic, South Africa, Spain, Sweden, Switzerland, United Kingdom, and United States of America. Individual dental hygienists, students enrolled in accredited dental hygiene education programs, and other professional organizations and health care providers may join the IFDH.
- The IFDH endeavors to provide online resources for dental hygiene colleagues. Our website, www.ifdh.org, provides information about the process of seeking employment in member countries, research and education, national and international meetings of interest, becoming a member, and projects and partnerships designed to improve the oral health of the public.
- One of our exciting new partnerships is with the Global Child Food Fund. We are working together to support a social responsibility award focused on improving the oral health of disadvantaged children. This volunteer project is designed to recognize, on an individual or student level, and non-professional and student dental hygienists who participate in a volunteer project which benefits disadvantaged children, mainly, but not exclusively, in low- and middle-income countries. Any dental hygienist who is either an Individual or Student member of the IFDH, or an IFDH Country Member is eligible to apply for the award. Applications are available through www.gcf-fund.org. Proposals are due by June 1, 2014, and awards will be announced on September 30, 2014. One winner will receive a cash prize of $5,000 to implement the project, and two runner-ups will receive cash prizes of $1,000 for their project.
- In addition, the IFDH is investigating a partnership with “Text2Floss”. This program is an innovative way to promote improved oral home care by texting reminder messages to brush, and floss daily. Additional educational information is offered concerning oral care including saliva and the pH of the mouth, heart disease and oral health, stress, and diabetes. There is an app for Ipad, Ipad minis, and Iphone 5s as well as through iTunes at bit.ly/1mFOxsR.

Every three years, the IFDH hosts an International Symposium on Dental Hygiene, providing an opportunity to network and learn the latest research and technologies supporting the growth of the professional. The next scientific symposium will be held from June 23 to 25, 2016 in Zurich, Switzerland. For more information about this meeting, visit http://isdh2016.dentalhygienists.ch.

We hope you will join us as we work together to improve the oral health of the public and support our profession around the globe!

JoAnn R. Gurenlian

Contact Information

JoAnn R. Gurenlian, RDH, PhD, is President of the International Federation of Dental Hygienists and Professor and Graduate Program Director of the Department of Dental Hygiene, Division of Health Sciences, of Idaho State University, jgurenlian@verizon.net

By JoAnn R. Gurenlian, RDH, PhD

Getting to Know the IFDH

Dr. Dina Debayo

D.D.S, MSc
Associate Clinical Professor
European University College
Diploma American Board of Pedodontics

Everyday Rinsing: An Essential Routine for Complete Oral Health

Oral hygiene is an integral component of one’s health and well being. It aids in the prevention of dental problems such as cavities and gum disease. Tooth loss can also be prevented or delayed with proper oral care. But good oral hygiene can do more than just keeping teeth and gums healthy; it can act as a mirror of one’s overall health.

Over the past decades, there has been a mounting interest in the possible interplay between poor oral hygiene and various diseases. One recent study has found that periodontal disease is associated with prothrombotic vascular disease reported to increase risk of myocardial infarction as well as for premature labor and low-birth-weight (PLBW) babies.1 Decreased function, increased severity of chronic obstructive pulmonary disease (COPD),2 and type 2 diabetes3 have also been linked to the gum disease. Experts say that poor oral hygiene, although modifiable, is an independent risk factor for oral human papillomavirus (HPV) infection.4

Recent studies have also put forth evidence that poor oral hygiene is associated with higher levels of risk of cardiovascular diseases (i.e., heart attack and stroke) and low grade inflammation, although further research is needed to confirm the underlying nature of such an association.5

Oral Hygiene Routines

The American Dental Association recommends the cornerstones of proper oral care – brushing and flossing.6

Brushing: Brushing the teeth twice a day with a soft-bristled brush is the key to healthy gums and teeth. The size and shape of the brush should fit the mouth to reach all areas easily. Toothbrush should be replaced every four or five months or when the bristles are frayed. A pea-size of fluoride-rich toothpaste may also come in handy.7

Flossing: Flossing once a day can help remove plaque from between teeth. It is an important part of the routine as plaque that stays in the mouth can eventually harden into calculus or tartar. Once tartar has formed, professional cleaning may be required for its removal.8

However, Brushing and Flossing May Not Be Enough

A strong body of evidence has shown that brushing and flossing are not effective enough to prevent dental caries and periodontal diseases. A trusted mouth rinse brand isListerine®, the first over-the-counter mouth rinse that has been awarded the American Dental Association Council on Scientific Acceptance.9 It offers different variants that are especially formulated to achieve ultimate cavity prevention. It contains a fixed combination of 4 different oils (i.e., thymol, menthol, methyl salicylate, and eucalyptol), individually enhancing its antimicrobial properties and flavors, and killing up to 97% of bacteria left behind after brushing and flossing. These oils have been clinically proven to offer superior antiplaque and anti-gingivitis efficacy to other medicated mouthrinses.10

Rinsing Can Help Reach What the Basic Routine Cannot

Adding rinsing to the brushing-flossing routine can help reach nearly 100% of the mouth and get rid of bacteria that cause cavities and periodontal diseases. A trusted mouth rinse brand isListerine®, the first over-the-counter mouth rinse that has been awarded the American Dental Association Council on Scientific Acceptance.11 It offers different variants that are especially formulated to achieve ultimate cavity prevention. It contains a fixed combination of 4 different oils (i.e., thymol, menthol, methyl salicylate, and eucalyptol), individually enhancing its antimicrobial properties and flavors, and killing up to 97% of bacteria left behind after brushing and flossing. These oils have been clinically proven to offer superior antiplaque and anti-gingivitis efficacy to other medicated mouthrinses.12

The latest addition to the oral hygiene arsenal is Listerine® Total Care Zero, which in addition to Rapid Fusion Technology, is fortified with zinc chloride ions that can reduce calculus build-up and keep teeth whiter.9 There are many options available but make sure to pick the rinse that best meets the patient’s personal care needs to guarantee a healthier mouth, a happier smile.

Information on Listerine contributed by JnJ Professional

References
Launch of Dental Hygienists Supplement in the Dental Tribune Middle East

By Victoria Wilson

Dental Tribune Middle East & Africa Edition | March - April 2014

Celebrating World Oral Health Day
20th March 2014

By Dr. Maimona A. Rahim, DDS

Dubai, UAE: The GCC Oral Health week is the annual celebration of all the efforts during the year to improve Oral Health. This year the celebrations will take place on 20th March 2014 at the Arabian Center – Al Khatamani Road in Dubai starting from 16:30 – 10:00 with the slogan being “Teeth, Health & Beauty”. The day will highlight on bad oral hygiene and the importance of dental visits. The targeted audience are all age groups, children, adults, men and women.

The event will be held under the patronage of Mr. Nasser Al Budor, Director of Dubai Medical District and Dr. Aisha Sultan, Director of Dental Services at the Ministry of Health. This wonderful celebration is made possible in collaboration with Dubai School for Dental Medicine (DSDM) and sponsored by Philips, Jordan, Beverly Hills tooth paste and First Gulf Bank. Several dentists from DSDM, Al Baraha Hospital Dental Department and various different clinics from UAE will be carrying out oral examinations, education, experiments, competitions and photo shooting throughout the day. Giveaways will be distributed by Jordan and Beverly Hills with 10 electric tooth brushes being sponsored by Philips for a competition. Balloons will be distributed by DSDM. The success of this event will be brought together by a team work of all including the Mall administration, Sponsors, Dentists and Audience.

All are invited and welcome to celebrate with us World Oral Health Day.
By Inside Dental Technology

Inside Dental Technology (IDT): Do you believe that CAD/CAM technology is here to stay in the dental profession?

Tuomas Lokki (TL): Absolutely. However, we are at the very beginning of this transformation. There are many new applications on the horizon. CAD/CAM technology is the entry point for many dental offices converting to digital processes and will be one of the primary technologies in the dental arena in the future. Dental laboratories are, in many ways, leaps ahead of the dental office. I see huge growth opportunities for laboratories in terms of complex and specialty cases because they are perfectly poised to offer dentists expert guidance.

Dental Tribune International
The World’s Largest News and Educational Network in Dentistry

Inside Dental Technology (IDT): How do you see the relationship between the dentist and laboratory evolving?

New digital impression technologies will improve the relationship between the laboratory and the dentist. The proliferation of this technology, as well as advancements in digital materials and equipment, will continue to make open and consistent communication between the dentist and dental technician absolutely crucial. New software, such as Planmeca’s Romexis, will facilitate this communication through better data management and open architecture, allowing for the easy import and export of digital files to and from any system, and also acting as the conduit that brings together all cases. Additionally, digital impressioning will open new avenues for laboratories to perform more complicated and demanding restorations in less time.

Inside Dental Technology (IDT): What are some of the critical factors that laboratories need to consider when working with their dentists?

Communication is critical to achieving the best results. Today’s technology opens the door to online communication and I would encourage laboratories to use those tools to design effective solutions in cooperation with their dentists. As these technologies continue to evolve and become more commonplace, the working relationship between dentists and dental technicians will allow for increased production capacity for both sides.

Inside Dental Technology (IDT): Are there scanning systems on the market today that smaller laboratories can afford?

Yes. Scanning systems continue to become more affordable. This allows everyone equal access to digital technologies and will help laboratories develop new product lines and services for their dentist partners. Modular systems, such as the Planmeca PlanScan digital restorative system, allow that flexibility for growth. You can start with the scan-only module and then move into the scan and design system, or go all in to full production milling.

Inside Dental Technology (IDT): There has been much debate on open versus closed CAD/CAM systems and whether conversion to a digital workflow requires multiple systems. What are your thoughts on this and how can Planmeca address these concerns?

Planmeca has always been a great believer in open platforms. Our Planmeca Romexis software platform provides tools that enable the dental team to visualize and share three-dimensional files, such as CBCT scan data and implant treatment plans, on one platform. This technology helps laboratories create implant-based restorations faster and better with guidance from oral surgeons. Also, due to increasing regulatory controls, dental laboratories that offer implants and implant abutments are likely to face increased regulatory reviews. This new level of compliance will require dentists to take on more responsibility in ensuring that they work with dental laboratories that can meet high quality standards and good manufacturing practices in order to produce such restorations.

Inside Dental Technology (IDT): What is your position on the expanding role of the laboratory as it relates to partnering with dental practitioners in the implant planning process?

Digital impression systems as they relate to dental implants, although a small piece of the restorative market, are growing 15% to 17% annually. We expect this trend to increase even more as the population base continues to age. The complexity of implants and the communication bridge that digital impressions provide requires an enhanced service level interface between dentists and dental technicians. Our Planmeca Romexis software platform provides tools that enable the dental team to visualize and share three-dimensional files, such as CBCT scan data and implant treatment plans, on one platform. This technology helps laboratories create implant-based restorations faster and better with guidance from oral surgeons. Also, due to increasing regulatory controls, dental laboratories that offer implants and implant abutments are likely to face increased regulatory reviews. This new level of compliance will require dentists to take on more responsibility in ensuring that they work with dental laboratories that can meet high quality standards and good manufacturing practices in order to produce such restorations.

Inside Dental Technology (IDT): What is your vision on how the dental industry will look in 5 years?

CAD/CAM will play an increasingly important role in the dental industry. Digital impressions in combination with 3D imaging will become the standard of care in many practices. The use of combined datasets has opened new avenues that pave the way to new applications and has created new opportunities for dental laboratories. We have only begun to imagine the impact of the digital impression and CAD/CAM revolution. I would like to invite you all to challenge the manufacturing community with your future needs even more exciting.

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Sirona’s international success: Russian clinic buys the 40,000th C8+ treatment center

By Sirona

Salzburg, Austria: Products “Made in Germany” have long been sought after around the world. This is also reflected in the international sales figures for the Sirona C8+. The treatment center combines high quality with timeless design.

The 40,000th C8+ dental center recently rolled off the production line at Sirona in Bensheim, the world’s largest production site in the dental industry – making this unit, which was designed for the global market, even more successful than the classic M1. The milestone unit and three other C8+ centers were purchased by the Kremlyovskaya Stomatologia dental clinic in Ryazan, Russia. “We have had very good experience with Sirona equipment. The company’s treatment centers are of a very high quality and are known for their reliability, long functional life, and support features for ergonomic patient positioning that prevent back strain while working,” said clinic director Andrey Archipenko, explaining his decision. “Made in Germany” is always a key quality factor around the world – especially in Eastern European, Latin American, Asian, and Arabian markets. The 50,000th C8+ treatment center was sold to a buyer in China in 2011.

Easy operation and timeless design

Because of the wide range of possible applications, the C8+ units can be found in practices, clinics, and universities in over 100 countries. The sturdy construction and intuitive operation make them ideally suited for ongoing use in clinical practice routine as well as for teaching.

In addition to its top quality, the timeless design of the C8+ gives it the high-end look. Users can choose between various finishes and three color schemes for the upholstery – elegant, natural, and active. Director Archipenko chose a premium décor in trendy orchid that blends seamlessly into his newly refurbished clinic. You can use the online C+ configurator to determine which color scheme best matches your facilities before purchasing. Dentists can design their treatment rooms virtually to get some initial assistance in selecting colors.

Optional features

Dentists can configure the C8+ individually depending on their personal preferences and local conditions. The range of optional features has been continually adapted in response to technical developments and sets new trends. For example, optional features include a brushless motor (BL ISO C), LEDview treatment lamp, and an intraoral camera system. Dentists who want to provide their patients with an especially comfortable atmosphere can also have their C8+ treatment center equipped with the new lounge upholstery, which has a premium cushion design, a soft, elegant feel, and an attractive double-seam look.

Exemplary ergonomics

With its serial ErgoMotion system, Sirona also ensures patients’ comfort and gives the treatment team optimal access to the mouth. At the same time, the individual operating elements are arranged to allow the dentist to work without back strain. The many options, the outstanding workmanship, and the timeless design make the C8+ a treatment center that is still very popular today – 40,000 units sold – with dentists all around the world.
AAID president-elect named vice dean at Harvard School of Dental Medicine

By Dental Tribune America

NEW YORK, USA: After an extensive nationwide search, AAID President-Elect John Da Silva, DMD, MPH, ScM, AFAAID, has been named vice dean at Harvard School of Dental Medicine. Dean Bruce Donoff stated that Da Silva’s “extensive institutional knowledge and experience in [HSDM’s] three focal areas — research, education and patient care — will be of great value as HSDM continues its strategic planning process.”

Da Silva serves on the board of trustees of the American Academy of Implant Dentistry and is currently the president elect. He is also chair of the Bylaws Committee and serves on the Education Oversight and Nominating committees. He has received widespread recognition during his academic career, including being named an honored fellow of the American Academy of Implant Dentistry and receiving the HSDM Distinguished Junior Faculty Award.

He has published numerous journal articles and lectured nationwide. Da Silva has made major contributions in research and the area of color science. He has also been involved in curricular changes to improve content on substance-abuse screening and brief interventions.

Da Silva was born in New York City and attended Williams College as an undergraduate. He received his dental degree from the Harvard School of Dental Medicine and his MPH degree from the Harvard School of Public Health. He later returned to the School of Public Health and received an ScM in health policy and management.

Da Silva completed specialty training in implant dentistry and prosthodontics at HSDM in 1992. He has been a faculty member there since 1995.
Planmeca makes CAD/CAM easier than ever

By Petri Kajander

Planmeca’s open-interface-based CAD/CAM solutions introduce, above all, quality, cost-efﬁciency and precision to the daily workflow at dental clinics or laboratories. Petri Kajander, Product Manager for Planmeca’s CAD/CAM solutions, explains the revolutionary features of these new products.

State-of-the-art solutions for dentists

Planmeca PlanScan® – super-fast intraoral scanner

The new Planmeca PlanScan® is a digital and powder-free intraoral scanner that scans the patient’s dentition quickly and accurately. The scanner produces real-time digital impressions from one-tooth to full-arch scans. Thanks to the open STL format, the scanned data can be sent to any dental laboratory for design work. This is the world’s first dental unit integrated intraoral scanner that can also be connected to a laptop.

“The scanner has only one cable, so it is extremely easy to move from one place to another, for example between different treatment rooms or clinics”, says Product Manager Petri Kajander. “In addition, the scanner is delivered with a laptop, so the device can be freely shared between different users. In other words, Planmeca PlanScan offers value for your investment: it is not a device for just one dentist but can be used by the entire clinic.”

The scanner utilises blue laser technique. It projects a pattern on the surface of the teeth and then analyses it from different directions while calculating distances. In this way, the device is able to calculate a model that is extremely accurate. “You can view the result as a real-time video image. The video recording and the dental surface identiﬁcation algorithm make the device extremely ﬂexible to use. Thanks to these features, you can pause the scanning at any time and continue later on at any point from which the data is already available.”

The scanner includes a range of exchangeable tips in various sizes, the smallest of these facilitating access to the posterior parts, particularly with small children and trauma patients. The tips can be autoclaved for efﬁcient infection control. In addition, the scanner is extremely durable since it has no other moving parts inside except for a fan that removes warm air. “Thus, the device stays calibrated and is not subject to mechanical wear”, explains Kajander.

Planmeca PlanCAD® Easy – efﬁcient design tool for prosthetics

Planmeca also offers dentists a new kind of open software solution for 3D design. Planmeca PlanCAD® Easy is seamlessly integrated in Planmeca Romexis® software and it is a user-friendly design tool for the design of inlays, onlays, veneers, crowns and bridges.

“The software runs on the so-called floating licence basis. This means that it is not tied to just one computer or workstation. For Planmeca’s system to work on the Planmeca Romexis® server. In this way, the scanning stage can be used only for scanning, while another workstation is used for the actual design work. This is a truly unique feature, which allows work to be continued straight away on another computer, while the scanner is ﬁxed for more productive operation”, says Kajander.

Every dentist designing his or her own prosthetic works will also face cases that require assistance from a dental laboratory. For this reason, Planmeca’s system utilises an open STL file format that allows the work to be sent immediately to a partner via the Planmeca Romexis® Cloud service.

Since Planmeca PlanCAD Easy is integrated in Planmeca Romexis software, soft tissue scans can also be conveniently paired with the patient’s CBCT image. This combined data provides valuable information for im-
plant planning, for example, because in addition to the soft tissues, it visualises the crown that is designed for the occlusion. This facilitates the planning of the implant screw’s location.

The Planmeca PlanCAD Easy workflow from preparation to the finished result includes just five easy stages: work description, scanning, marking of the margin line, automatic design, and sending the work to the mill. “Once the work has been sent to the mill, it is transferred there in its entirety and the mill’s computer finishes the work. In this way, the software and scanner are immediately freed for a new assignment.”

The software is very user-friendly. All design phases are saved automatically, and if further impressions are needed, previous phases can be returned to flexibly. The automatic design software automatically takes into account the adjacent teeth’s cusps and marginal ridge in addition to the contact strengths defined by the user. This creates a design that always fits its surroundings.

Planmeca PlanMill® 40 – fast and precise milling unit for dental clinics

Planmeca PlanMill® 40 is an extremely precise four-axis milling unit operating under the control of its own computer. The device is suitable for all the indications of a single tooth, in other words for the milling of crowns, inlays, onlays and veneers. The mill can manage bridges of up to five units to the posterior and three units to the anterior area.

Since the mill handles the milled pieces completely independently, as many as several dozen pieces can be sent to the mill at a time. In addition, the device tells which block size, colour and material should be used, so any member of the staff can place the block in the mill. “This saves everyone’s working time. The dentist does not need add the block himself, but anyone can do it”, says Kajander.

The mill has a six-tool exchange mechanism, and it changes tools independently according to different job requirements. In addition, the device mills different materials according to their properties. For example, it knows how to gently handle delicate ceramics in work phases that require precision. “If you

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Interview: “Kennedy’s wound was clearly incompatible with life”

Dr. Don T Curtis speaking at a revet event on the occasion of the 50th anniversary of the Kennedy assassination. (DTI/Photo Stephanie Price/ Pushandile-Plains Historical Museum, USA)

By Dental Tribune International

Few people are granted the opportunity to become an active part of historical events. Seventy-six-year-old Dr. Don T. Curtis, a former dentist from Amarillo in Texas, is one of them. As a resident in oral and maxillofacial surgery at Parkland Memorial Hospital in Dallas, he was one of the first doctors to have performed emergency treatment on U.S. President John F. Kennedy after he was shot on 22 November 1963.

Dental Tribune ONLINE had the opportunity to speak with him about that day and the reason he thinks that there was more to the assassination than a lone gunman.

Were you aware of the president being in Dallas on 22 November 1963?

I was aware that he was coming to Dallas, but I was not aware of the nature of the injury to the president because his head was on a pillow and I could not see a wound. I remember the chief of neurosurgery, Dr. William Kemp Clark, rotating Ken- nedy’s head to the left, revealing that the posterior part of his skull had been radically fractured. He then said, “Stop, this injury is incompatible with life.”

What was the atmosphere in the room?

I was concerned about the president’s ability to breathe, so I decided to do a tracheostomy. Dr. Car- mel Malcolm Perry, a senior resident surgeon, came into the trauma room soon after she arrived at the airport.

I helped the nurse to undo the president’s tie and remove his shirt to prepare him for the procedure. Then Dr. Malcolm Perry, a senior surgeon, came into the room and it was decid- ed that he should do the tracheostomy. Dr. Car- mel assisted Dr. Perry, and I performed a cutdown on the left leg to provide for intravenous replacement of blood.

I told my patient that her sur- gery had been postponed. She understood that. Since there was nothing else for me to do, I then cleared my business in the clinic and went home. There, we spent the week- end watching television and listening to the news on the radio. We were relieved that President Lyndon B. John- son had made it safely back to Washington and that the gov- ernment was uninterrupted.

Finally on Sunday, we learned that the suspect, Lee Harvey Oswald, had been shot, which indicated that there was something going on in addition to just alone shooter.

The majority of Americans do not believe that Oswald acted alone by hitting Kennedy with three shots in the back, as con- cluded by the report of the War- ren Commission appointed by the government to investigate the circumstances of the assassi- nation. Did you observe any irregularities between this official version and the events you witnessed?

The Warren Commission’s re- port reflected what the people wanted to hear, which was that Oswald acted alone and that there was no conspiracy. The doctors of Parkland however when wiping the blood from Kennedy’s neck for the tracheo- stomy found a single bullet hole that was apparently an entrance wound which meant that must have been a projec- tile that entered the president from the front. Because of its nature, another wound on the back of Kennedy’s head was an exit wound, so there must have been at least two bullets that came through the front.

While all the doctors’ testi- monies, including mine, were already in the literature and the report, knowledge of the wounds did not have much influence on the Commission’s overall conclusion. Why it was inter- preted that way has remained a mystery for the past 50 years.

What do you believe actually happened that day?

My personal belief is that there were of course multiple shoot- ers and that Oswald did not do it alone. This would indicate however that there was in fact a conspiracy.

The events, you stayed at Parkland Memorial Hospital for another two years. Were the events still discussed by the staff in the aftermath?

We actually never talked about it. This was something we just did not want to discuss. How- ever, I left Parkland in 1965 for an exchange residency in Lon- don and Zurich, where I often discussed the events with my colleagues abroad. Particular- ly in England, there was much interest in U.S. politics and the assassination.

You recently went public with your knowledge after 50 years. What were your reasons for do- ing so?

Everything that I would say is already in the literature about the assassination but I think there needs to be general knowledge of what people who were actually involved knew.

More than six million pages of classified evidence on the Ken- nedy assassination are going to be released by 2017. Are you interested in this knowledge, or do you consider that chapter of your life closed?

There is a great deal of spec- ulation of what information these documents actually con- tain. I do not look forward to it but would be interested to know what could be learned from them.

Thank you very much for the interview.
The dental laboratory's primary role in restorative dentistry is to functionally and aesthetically restore the patient’s existing dentition. The clinical models from these impressions are created and mounted on an articulator that simulates the jaw movements of the mandible (Fig. 2). Impressions are created and sent to the laboratory for incorporation into the digital world of image design—with the addition of the latest developments in intra-oral laser scanning, materials and computer milling/printing technology—will only enhance the close cooperation and working relationship of the dentist/dental laboratory team (Fig. 1).

The current laboratory fabrication process follows a very linear progression: model fabrication, day one; waxing, day two; finishing, day three; ceramics, day four, etc. Average production time for an all-ceramic or porcelain fused-to-metal restoration is approximately five to seven working days based on this fabrication method. Once the impression is received at the laboratory, the impression can be scanned and data sent to several digital production stations at the same time. This will potentially allow the model, the restorations (both framework and waxup) and the final ceramic restoration to be completed at the same time (Fig. 6).

Comparison is key. The ability to facilitate communication between the dentist and the lab is of utmost importance and what makes the E4D system stand out. Tools such as the E4D Sky network enable E4D clinical operators to communicate and facilitate the transfer of data to technicians whenever laboratory involvement is required. With just a click, the entire case (whether scanned or completely digitally designed) can be sent from chairside to the laboratory for fulfilment of both dental professionals with basic knowledge of dental anatomy and occlusion to make modifications to the design, and then sends it through to the automated milling unit. For the dental lab profession, the introduction of digital technology effectively automated or even eliminated some of the more mechanical and labor-intensive procedures (waxing, investing, burnout, casting, and/or pressing) involved in the conventional fabrication of a dental restoration, allowing the dentist and technician the ability to create functional dental restorations with a consistent, precise method.

Linear versus vertical manufacturing. The successful laboratory of the future will need to focus not just on the quality of the end product, but also more efficient production methods to reduce turnaround time within the laboratory process. Digital technology will allow the laboratory

Possibility to use CAD/CAM technology, the...
Sirona Group receives another Top Employer Award

By Sirona

Fig 1: Sirona China is delighted to receive the Top Employer China 2014 award and together with the other 40 winners, it’s difficult to tell who is the happiest.

Fig 2: Michael Elling, Vice President Corporate Human Resources of the Sirona Group (2nd from right), Daisy Zhang, HR Manager China (3rd from right) and Henning Müller, Vice President Sales China, Hong Kong, South East Asia (1st from left), proudly accepted the “Top Employer China 2014” award (from the event host (right)).

SALZBURG, Austria: Since receiving the Top Employer Awards for Germany, Austria and Engineers in 2015, Sirona’s excellent human resources policy and very good working conditions have also earned it international recognition in 2014. In an award ceremony in Shanghai, Sirona China was given the “Top Employer China 2014” award in mid-January. The company’s German employees have also been successful at the Chinese site.

In a multi-phase analysis and auditing process, the Top Employer Institute (formerly CRF Institute) designates outstanding employers around the world every year. Some of the key criteria include excellent working conditions, promoting talent, and continuous development of human resource management. Sirona China was given the highest award “Top Employer China 2014” along with 40 other employers. Michael Elling, Vice President Corporate Human Resources of the Sirona Group, expressed his satisfaction: “Our employees are the heart of our company. The Top Employer Award for Sirona China is an acknowledgment of our local and global efforts to support our employees. It is part of our global growth strategy, it increases our attractiveness as employers, and it motivates our employees to work at Sirona in Germany and abroad.”

Growth and development at Sirona China

In 2006, Sirona began to develop the business in China with just 50 employees. Today, eight years later, there are more than 150 employees here – a success story, also with respect to personnel development. “Employee satisfaction is the basis of our success at Sirona China. This is why we find it important to have an excellent team, promote team spirit, and motivate continuing development among our employees. It is rewarding to see how many employees successfully climb the career ladder,” explains Henning Müller, Vice President China and South East Asia. A strong growth that is reflected in the market, Sirona China is the number one company for dental treatment chairs. Digital dentistry and CAD/CAM products have also made significant gains in the past two years.

Employee success stories

Sirona offers many opportunities and promotes young talent among students as well. For example, the German student Verena Schütter spent four months at Sirona in Asia during her International Business studies at Baden-Württemberg Cooperative State University. There she became familiar with the international market and the Shanghai location, and she helped develop the Singapore office, which was opened in November 2013. A career opportunity open to all employees at Sirona fostered by the Talent Excellence Program encompasses individual advanced training, project assignments across positions and locations, and targeted international and career advancement in one of its worldwide subsidiaries.

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So saliva collected at a constant flow rate for 2 minutes will have a different composition from saliva collected at the same flow rate for 10-15 minutes.

• Nature of the stimulus – Different stimuli have an effect on salivary composition, mainly because of their effect on the rate of flow. Acid is the most potent stimulus for the rate of flow. Acid is an effect on salivary composition, an increase in which results in an increase in pH. At very low flow rates, the pH of parotid saliva can be as low as 5.5, rising to 7.8 at very high flow rates. Individuals with hyposalivation will thus have a low salivary pH and a low salivary buffering capacity because of the low bicarbonate concentration.

**Conclusion**

Saliva not only plays a pivotal role in the maintenance of a healthy homoeostatic condition in the oral cavity, but contributes to one’s overall health and well-being. Components from saliva interact in different ways with the dentition to protect the teeth. Patients who lack sufficient saliva suffer from many oral diseases, of which caries is only one. To alleviate discomfort they are advised to use saliva stimulants and substitutes which have the function of lubricating the oral surfaces. Chewing gum is increasingly being viewed as a delivery system for active agents that could potentially provide direct oral care benefits, as it promotes a strong flow of stimulated saliva.

The fourth edition of Saliva and Oral Health is available in hard copy or e-book format at www.shancocks Ltd.com. A full list of references is included in the book.

*Underwriting costs for this Saliva and Oral Health edition were provided by Dr. Michael Dodds and The Wrigley Company.*

**References**


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a broad range of products and brands,” Van Duinshoven said.

The group includes KaVo, Kerr, Kerr TotalCare, Pentron, Axis, SybronEndo, Orascoptic, Pelton & Crane, Marus, DCI Equipment, Gendex, DEXIS, Instrumentarium Dental, SOREDEX, i-CAT, NOMAD, Implant Direct and Ormco. Their services and products primarily serve the general practitioner, dental specialist, hygienist, institutional and special markets customers in virtually every dental market in the world, including North America, Latin America, Europe, the Middle East, and the Asia Pacific region.

Danaher also stated that each company will continue to market itself under its current brands to local customers and individual markets.

According to Matt Garrett, vice president of marketing for KaVo Kerr Group, it will be presenting 20 new products in celebration of its formation at this year’s Chicago Dental Society Midwinter Meeting, which is being held until tomorrow.