WILLIAM YANT, DDS

Dr. William Yant received a bachelor of science degree in psychology from Michigan State University in 1988 and his DDS from the University of Maryland in 1992. He has been in private practice in the mountains of western Maryland since 1992. He has completed courses in advanced dentistry with The Dawson Academy and completed a surgical externship for dental implants with Midwest Implant Institute in 1996. With over 20 years of implant experience, he stays committed to providing his patients the best care by continuing to seek dental techniques and equipment to aide in optimal results.

Using CBCT to Full Extent to Maintain Patient Safety

Through proper protocols you can use CBCT for accurate diagnosis and treatment planning without exposing patients to unnecessary levels of radiation.

What's your primary role as a dental professional? Prevention, diagnosis, and treatment, correct? Additionally, you want to provide clinical care safely and cost-effectively for your patients.

The advent of CBCT technology provides an opportunity to enhance the care you provide. However, when it comes to CBCT, the issue of safety often comes up, both within the dental community and among patients.

Both groups consider many of the same questions: Is it necessary? What benefit does it offer above and beyond bitewings and other traditional dental x-rays? Will the radiation exposure during CBCT put patients at risk?

In this e-book, we'll look at some of the benefits of CBCT and how to minimize many risks.

The Value of CBCT Technology

In my practice, the value of CBCT can be summed up in 3 simple statements:

1. We discover unknown problems.
2. We obtain the correct diagnosis sooner, and often arrive at a diagnosis we might have missed without CBCT.
3. We provide better treatment that saves patients time and money, and results in better clinical outcomes.

Recently, I had an experience that put these 3 statements into action. A patient came in for a routine cleaning. When we acquired Planmeca ProMax extraoral bitewings, which provide the advantage of showing the entire tooth, I noted a radiolucency on tooth No. 12 (Figure 1). To evaluate the anatomy of the tooth and the possibility of treatment in our office, we took a Planmeca Ultra-Low Dose (ULD) CBCT image and discovered a complicated case that I didn't feel comfortable treating (Figure 2). I shared the images with an endodontist for a second opinion. After consulting with our referring endodontist and the patient, the treatment option of attempting the root canal was declined, and the treatment course of extraction and eventual dental implant treatment has begun. ULD helps guide the practitioner and the patient to the best treatment course for this situation.

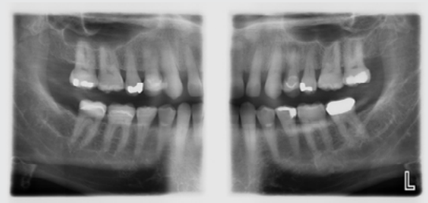

Figure 1—A radiolucency discovered in the panoramic bitewing prompted evaluation of the tooth shape using CBCT.

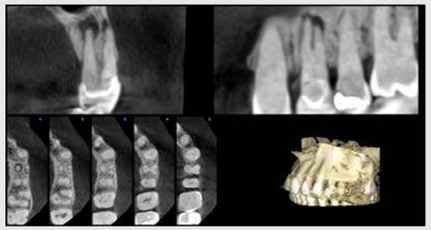

Figure 2—The CBCT images showed the level of difficulty of the case. The images were shared with an endodontist to determine the most efficient and cost-effective next steps for this patient.

Addressing Patient Concerns

Without question, some patients will voice concern about the use of CBCT. Your best bet in these situations is to have all the facts. Be prepared to answer their questions compassionately and intelligently.

Start by listening to their concerns and then offering information without being dismissive. You can begin by explaining the ALADA (as low as diagnostically achievable) principle and how dentists and dental product manufacturers use it to keep radiation exposure as low as possible to ensure patient safety, while at the same time producing images at a level appropriate for accurate diagnosis and treatment planning.

Finding the Right Combination of Quality and Safety

The best way to ensure high-quality imaging and radiation dose safety is to choose a CBCT system that addresses both of these needs.

I started my research into digital radiography about 10 years ago, and I talked to experts who are well versed in the technology. After speaking with many oral radiologists about systems that meet the requirements of image quality and patient safety, as well as ease of practice integration, I chose Planmeca ProMax. I started with 2D and the system has grown with me—about 5 years ago we upgraded the 2D unit to 3D and Planmeca Ultra-Low Dose. I loved the path to upgradability. It was a very easy transition, building on acquired product and software knowledge, which really helped to minimize the learning curve.

Putting Patient Safety First

To address the issue of patient safety, Planmeca developed their Planmeca ULD protocol. This allows you, when appropriate, to perform CBCT imaging at an even lower effective patient dose than standard 2D panoramic imaging.* I am not aware of any other manufacturer that offers ULD without a reduction in image quality.

In my office, we use ULD 80% to 90% of the time. I use it for implant planning, evaluating for periodontal treatment, and if we suspect a difficult root canal problem. By combining extraoral bitewings with ULD CBCT images, we change our treatment plan for at least one patient a week, significantly improving our clinical outcomes.

Case in Point

Here are some examples of cases from my practice where the Planmeca ULD protocol provided us with the imaging we needed to accurately diagnose and plan treatment without exposing patients to unnecessarily high doses of radiation.

Planmeca ProMax Features

- Exclusive, patented SCARA (Selectively Compliant Articulated Robotic Arm) technology for unlimited imaging options and upgradability
- Offers versatile all-in-one 2D/3D imaging capabilities with a single sensor
- Features exclusive Planmeca Ultra-Low Dose protocol for an average of 77% reduction in radiation without statistical reduction in image quality*, a Planmeca exclusive
- Selectable imaging with appropriate volume sizes, resolutions, and exposure values for optimized diagnostics and increased patient safety

*When compared with standard imaging protocols, according to "Dosimetry of Orthodontic Diagnostic FOVs Using Low Dose CBCT Protocol" by JB Ludlow and J Koivisto.

CBCT PRIMER

With the following knowledge in your back pocket, you can better answer your patients' questions.

How is radiation dose measured?

An effective dose is measured in micro Sieverts (μSv), which is the amount of energy absorbed per unit mass.

What is an effective dose of radiation?

An effective dose using CBCT ranges from 4 μSv to 1073 μSv. Several factors influence the effective dose of specific CBCT systems, including the imaging detector, imaging parameters, field-of-view, voxel sizes, and systemic factors of the patient.

Are children more sensitive to radiation than adults?

Yes, they are. For example, a child 10 years of age exposed to the same radiation dose as a 30-year-old adult is 3 times as sensitive.

Why CBCT rather than a traditional x-ray?

CBCT provides more detailed information that can lead to better diagnosis and treatment outcomes. In other words, the benefits of an accurate diagnosis outweigh the risks.

Click here to learn more about CBCT and how this affordable technology can improve patient care and boost ROI.

Case 1

When I reviewed a panoramic radiograph of a new 34-year-old patient, I detected decay on teeth Nos. 17 and 18 (Figure 1A). Our initial treatment plan involved extraction of No. 17 and a core and crown for No. 18, which was an asymptomatic previously treated root canal tooth (Figure 1B).

After evaluation using Planmeca ULD protocol, we discovered a periodical lesion on tooth No. 18 (Figure 1C). Following discussion with the patient, he accepted an alternate treatment: extraction of No. 17 and 18 with a bone graft for placement of a dental implant, abutment, and crown.

In this case, we avoided wasting the patient's money and time. In a 2D world, we would have pulled tooth No. 17 and then placed a crown on No. 18, and then ended with egg on our face when it failed. I routinely use the Planmeca ProMax in ULD mode when doing 3rd molar extractions to see if it's appropriate for me to remove a tooth or if I should refer the patient to a specialist. In this case, as a secondary finding, we discovered a problem and provided the patient with better clinical treatment.

Figure 1A—Panoramic radiograph showing decay on teeth Nos. 17 and 18.

Figure 1B—Intraoral photograph showing the patient's oral condition as he presented to the office.

Figure 1C—The CBCT evaluation using Planmeca's ULD Protocol revealed a periodical lesion, which lead to an alternate treatment plan and ultimately a better outcome for the patient.

Case 2

A patient arrived for routine dental care with no history of pain. Periodontal probing revealed 8 mm on the mesial of tooth No. 30. The initial image (Figure 2A) showed an abscess in the area of teeth Nos. 30 and 31. We then acquired a ULD CBCT image (Figure 2B). The patient accepted removal of teeth Nos. 30 and 31, and we also attempted to treat the distal bone defect on tooth No. 29. After 3 months of healing, a ULD CBCT image was acquired for evaluation of implant placement (Figure 2C). This image was then transferred to our guided software, taking advantage of the open architecture of the Planmeca platform (Figure 2D). Figures 2E (ULD CBCT image) and 2F (Planmeca extraoral periapical image) show the implant after placement and the crown in place with full healing noted on tooth No. 29.

Figure 2A—Initial image shows an abscess at teeth Nos. 30 and 31.

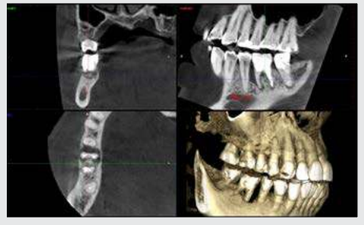

Figure 2B—A CBCT image using Planmeca's ULD protocol provided more detailed information for educating the patient about his treatment options.

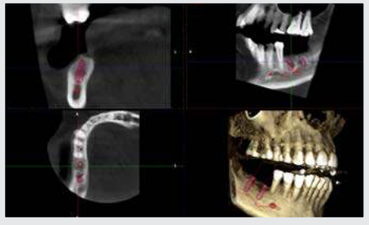

Figure 2C—After extraction of teeth Nos. 30 and 31 and treatment of tooth No. 29, a ULD CBCT image was taken to evaluate the patient for implant placement.

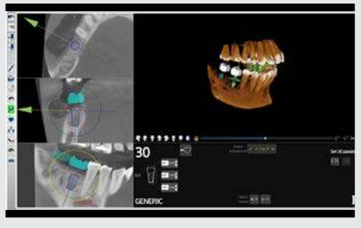

Figure 2D—The CBCT image was transferred to our guided software to plan implant placement.

Figure 2E— Postoperative CBCT image acquired with ULD protocol was taken to evaluate healing.

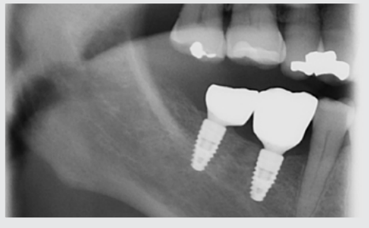

Figure 2F— Planmeca extraoral periapical image shows the implant and crown in place. Also note healing at tooth No. 29.

Case 3

A 20-year-old male patient presented with congenitally missing teeth Nos. 7 and 10. He had received orthodontic treatment to make room for eventual implant placement. Since the age of 14, the patient had been wearing a retainer with 2 plastic teeth as he waited to physically mature enough for implants.

When the patient came to our office, the retainer had broken and he said he was ready for implants (Figure 3A). However, our clinical exam revealed minimal ridge width in the area of teeth Nos. 7 and 10 with mobility of teeth Nos. 8 and 9.

We acquired extraoral posterior and anterior bitewing radiographs and CBCT images using Planmeca ULD. When reviewing these diagnostic images, we learned that the bone sites for implants in the area of teeth Nos. 7 and 10 were inadequate and would require grafting. We also discovered that tooth No. 9 had minimal bone on the labial plate and that tooth No. 8 had no radiographic bone on the labial plate.

After discussing clinical and financial considerations with the patient, implant treatment was deferred into the long-term future, knowing that treatment of teeth Nos. 8 and 9 may also be required. We chose a 6-unit zirconia Maryland bridge as a transitional solution, providing the patient with "permanent teeth," acting as a retainer and splinting the mobile teeth Nos. 8 and 9.

Figure 3A—Pre-operative view of the patient's congenitally missing teeth Nos. 7 and 10.

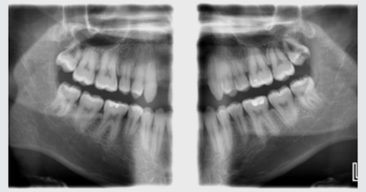

Figure 3B—Extraoral bitewings of posterior.

Figure 3D—Anatomical rendering from Planmeca ProMax CBCT scan confirms lack of adequate bone at the potential implant sites.

Figure 3C—X-rays of the anterior also show potential implant sites with inadequate bone.

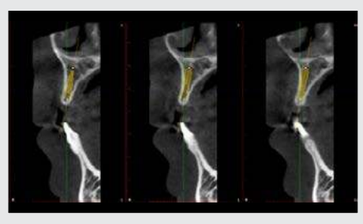

Figure 3E—This cross-section reveals minimal bone for implant placement in area of tooth No. 7.

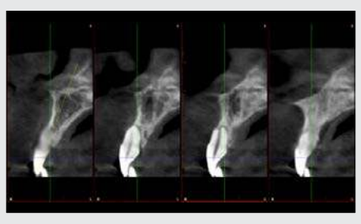

Figure 3F—This cross-section reveals no bone on the labial plate of tooth No. 8.

Figure 3G—Post-operative view of the transitional 6-unit zirconia Maryland bridge.

Meet the Planmeca ProMax 3D Family

How Does ULD Work?

First, you need to understand how a regular CBCT image is acquired. The system rotates the x-ray source and the sensor, taking several 3D frames from multiple angles. Each frame uses a short x-ray pulse with specified kilovoltage (kV) and milliampere (mA) values.

When you apply the Planmeca Ultra-Low Dose (ULD) protocol, you lower the mA and shorten the x-ray pulse required for each frame, and mathematically identify the image noise through a Planmeca proprietary algorithm. This algorithm identifies and removes the image noise without affecting diagnostic outcome. The result: a high-quality diagnostic image*, lowered patient dose (to protect the patient) and faster rotation time to ensure image quality.

Most CBCT systems that offer a low-dose feature take fewer frames or use smaller rotation angles, but they cannot identify and remove image noise. This limits resolution and volume size options and can adversely affect image quality and diagnosis. The Planmeca ULD protocol can be used with any resolution or volume size, which is exclusive to Planmeca.

Please click here for a video on ULD.

Click here for a study about ULD.

CBCT Can Make an Impact on Your Practice

When we use CBCT technology judiciously, we provide ourselves, and our patients, with the opportunity for more successful treatment outcomes. In my practice, I've found that having this tool at my disposal allows me to make better-informed decisions about how treatment should proceed. In addition, I've been able to save my patients time and money.

As I noted earlier, by combining extraoral bitewings with Planmeca ULD protocol CBCT, I've changed at least one treatment plan per week. Stated another way, I've prevented one mistake per week. That's important to me, and I'm guessing it would be very important for you, too.