

“Three-dimensional imaging touches all aspects of dentistry”

An interview with Dr Steven Guttenberg & Dr John Flucke, USA

_Imagine a technology that brings the most detailed knowledge of the patient's dental anatomy and greater treatment predictability right into the dental office. A good imagination is no longer necessary to achieve this goal. That technology, CBCT imaging, is not just a dental daydream but also a reality every day in many dental offices nationally and internationally.

Three-dimensional technology is already redefining dental outcomes across a broad spectrum of treatment options, including implants, bone grafting, oral surgery, orthodontics and endodontics. The ability to capture a 3-D image of the mouth and to view it from all angles, together with the capability of rotating that 3-D mode and zooming in on details, can only result in more effective dental treatment.

With cone beam, all of the information can be coordinated for integration with other applications, such as guided implant placement software or

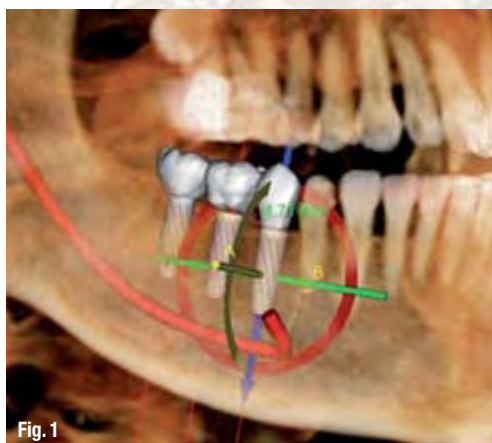


Fig. 1 Proficient technology: Restorative-driven implant planning.

CAD/CAM. Since the i-CAT and the GXCB-500 capture scans in DICOM format, clinicians can combine this high-resolution data with digital 3-D impression scan data to perform restorative-driven implant planning and take advantage of CAD/CAM milling (Fig. 1). Software navigates the clinician through the planning process using virtual implants. CAD/CAM yields a surgical guide that ensures the plan translates into precise placement of the actual implants and facilitates final implant restoration milling. Paring these two technologies ultimately reduces the risk of poorly placed implants.

Dentists who have already implemented 3-D technology are seeing results, from more proficient diagnosis to more defined treatment planning and increased case acceptance. **CAD/CAM** spoke to Dr Steven Guttenberg, owner of i-CAT, and Dr John Flucke, owner of GXCB-500 HD, who share their experiences on how CBCT is helping to change the face of dentistry across a wide range of procedures.

_CAD/CAM: How is dental imaging broadening the scope of dental procedures for the general dentist as well as specialists?

Dr Guttenberg: With 3-D imaging, the dental profession is experiencing a real paradigm shift. Dental radiography has come a long way from the first X-ray taken by Wilhelm Roentgen of his wife's hand in December of 1895. However, even with a panoramic radiograph, we are getting a 2-D representation and making diagnostic and treatment decisions for a 3-D object.

CBCT imaging gives dentists the opportunity to diagnose and plan treatment more efficiently. While I thought that I would use my i-CAT primarily just for implant procedures, I now use it for everything—taking out a tooth that is close to the nerve, exposing a tooth for orthodontics, for implants, TMJ treatment and trauma. Three-dimensional imaging touches all aspects of dentistry, from endodontics looking at teeth cross-sectionally, to orthodontics for non-surgical treatment or for integration for SureSmile robotic archwire technology.

When I think about the many ways that scans can be viewed and the scope of information that each scan provides (Fig. 2), the list of procedures that can benefit from this technology just keeps getting longer—I use it for extraction, pathology, orthognathic surgery, airway studies, dento-maxillofacial trauma, implants, bone grafts and evaluation of the paranasal sinuses.

_What type of dentist really needs 3-D imaging?

Dr Guttenberg: Being at the International Congress on 3-D Dental Imaging last year was an eye-opening experience. I witnessed how doctors of different specialties and general dentists use this innovation. For any practice to expand and improve, a dentist must embrace change. Physicist Thomas Kuhn, who first coined the term paradigm shift in 1962, noted that scientific advancement is not evolutionary, but is rather “a series of peaceful interludes punctuated by intellectually violent revolutions. In those revolutions one conceptual world is replaced by another.”

Cone beam, to me, represents a revolutionary concept in imaging. Six or seven years ago, it was just

being looked upon with curiosity, but now it is becoming the standard of care for dental radiography. Education in the possibilities that 3-D imaging brings to the practice is invaluable.

While 2-D still has its place in the dental practice, many patients need more for optimal care. Change is not easy, but it is necessary to change to move forward and to provide patient care in a better manner. Three-dimensional imaging is definitely a paradigm shift, letting dental professionals see the same information in an entirely different way. Nothing else really describes what is going on here.

What do you tell general practitioners who may feel intimidated by this technology?

Dr Flucke: That question is exactly the reason that I entitled my seminar Scrabble and Alphabet Soup —Bringing Simplicity to Cone-Beam Technology. There is a lot of hesitation on the part of some general dentists that cone beam is just for the realm of the specialist or the dental school. When faced with acronyms such as CBCT, cone-beam computerised tomography, or terms such as voxel, the 3-D equivalent of a pixel, they get intimidated by the mishmash of initials and unfamiliar words. They just want an X-ray.

After becoming educated about 3-D imaging, they realise that it is not as intimidating as they first expected. I am not an electrical engineer or radiologist; I am just a dentist who uses 3-D cone beam to improve patient care, and that is why it is important to hear about this technology from people like me. Far more important than the Scrabble and alphabet soup, imaging is all about providing the best possible outcome for the patient.

Can you share a case from your own practice?

Dr Flucke: There are so many cases, but this case in particular was very satisfying. A new patient arrived at my practice eight months after seeing her previous dentist, who she had seen for the past ten years. The patient had always been diligent, almost fanatical, about her dental health, but was two months overdue for a cleaning.

We took a CBCT scan and found an undetected cyst growing in the mandible almost to the point of causing a fracture of the mandible (Fig. 3). When we pointed this out, the patient responded, "Maybe that is why my lip goes numb sometimes, and I get these shooting pains in my jaw."

While the patient wondered why, even throughout her regular visits to the dentist this condition went undiagnosed, I recognised that the previous dentist was not really at fault. The dentist had been taking the necessary required radiographs over the years, 20 film

2-D surveys, but this patient needed more. Because of the various options in viewing 3-D technology, I sent the scan out to a radiologist and subsequently referred the patient to an oral surgeon. The CBCT showed that as the cyst grew, it was putting pressure on the nerve, causing the pain and numbness.

Four different outcomes were possible for this condition, and two could have either been life-altering or life-threatening. Fortunately, the situation turned out to be benign, necessitating some extractions and bone grafting. Afterward, the patient asked, "Why did I go somewhere else for ten years, and the dentist never saw this, when you found this after ten minutes?" It was all thanks to CBCT.

What is your main message to dentists contemplating implementation of CBCT?

Dr Flucke: I'm a general dentist. I use and believe in this technology. I have seen so many scans that have changed the course of treatment or provided the missing information for difficult diagnoses. By being a speaker at the International Congress on 3-D Dental Imaging, this is what I want people to know: Don't be afraid to use 3-D imaging. Use it because it is the smart and the best thing to do. The end game is making the lives of our patients better and cone-beam 3-D imaging is the best way to do that.

Dr Guttenberg: To say it with George Bernard Shaw's words: "Progress is impossible without change, and those who cannot change their minds cannot change anything."



Fig. 2

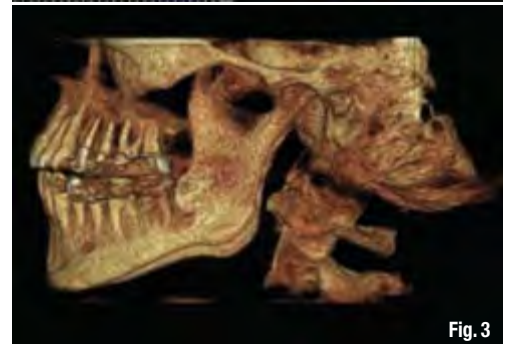


Fig. 3

Fig. 2 Amazing views into a patient's anatomy.

Fig. 3 Previously undiagnosed disease found on a CBCT scan.

about the interviewees

CAD/CAM



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Dr John Flucke practices in Lee's Summit, Missouri, USA. He is a well-recognised expert and educator in dental technology.

Dr Steven Guttenberg is an oral and maxillofacial surgeon, practicing in Washington, DC, USA, where he is director of the Washington Institute for Mouth, Face and Jaw Surgery.