






THE HOT SEAT

Cone-Beam Computed Tomography

Contributor	Do you use a CBCT machine as your primary imaging modality?	Do you prefer the standing or seated type of CBCT machine?	Have you encountered resistance to using CBCT?	How often do you have your CBCT scans read by oral and maxillofacial radiologists?
 <p>Sean K. Carlson, DMD, MS Mill Valley, CA</p>	<p>Yes, we use CBCT on every patient.</p>	<p>I prefer a sitting model. I think it is easier to get fidgety kids to sit still as opposed to stand still.</p>	<p>Very little. I created some podcasts to help answer questions about dosimetry and educate patients (http://youtu.be/jTi_RlKwAng).</p>	<p>Rarely—only if there is something on the image I do not recognize. CBCT scans are much easier to read than two-dimensional panos and cephs.</p>
 <p>Stuart Frost, DDS Mesa, AZ</p>	<p>Yes.</p>	<p>I have owned both and I prefer sitting, because there is less patient head movement.</p>	<p>Not only have I not had resistance, but I have had parents and patients thank me for using the latest imaging technology.</p>	<p>Fewer than 10% are sent out to be read.</p>
 <p>Duane Grummons, DDS, MSD Spokane, WA</p>	<p>Limited-field-of-view mini-scans are prescribed for 40% of my patients, larger field-of-view scans for 5%.</p>	<p>I prefer sitting models for comfort and head stability, reclined models for sleep- or breathing-disordered patients.</p>	<p>Sometimes, regarding radiation exposure. We educate patients about ambient radiation (e.g., air travel, sunshine) and the low doses of CBCT vs. dental x-rays.</p>	<p>90% of my full-volume scans, 3% of the mini-scans. The radiology report is a useful tutorial.</p>
 <p>Ed Lin, DDS, MS Green Bay, WI</p>	<p>Absolutely! Especially with low-dose CBCT.</p>	<p>Sitting types provide better stability for the patient to minimize any movement.</p>	<p>No. We have educated our patients on the risks and the benefits.</p>	<p>It is a patient option on our informed-consent form, used by about 33%.</p>
 <p>James Mah, DDS, MS, DMS Las Vegas, NV</p>	<p>Yes, it is the most comprehensive imaging modality available in orthodontics, and it has the best diagnostic specificity and sensitivity.</p>	<p>No preference. Staff training is essential to minimize motion artifacts.</p>	<p>Yes, mostly from individuals or professional groups that do not understand radiation dosimetry and risk-benefit analyses. I have never had a patient decline this diagnostic test.</p>	<p>I review and report every case but have access to oral and maxillofacial radiologists and oral pathologists as needed.</p>

This regular column is compiled by JCO Contributing Editor John W. Graham, DDS, MD. Selected participants are asked for brief replies to a series of questions on a single topic. Your suggestions for future Hot Seat topics or participants are welcome.



What are you using CBCT scans for other than diagnosis?	Does CBCT make you a better clinician?	What are the hurdles that prevent more clinicians from using this technology?	Will CBCT become the standard of care in orthodontics?	How do you think we will be using CBCT scans in the future?
Progress scans and third-molar review, which usually involves an 8cm x 8cm scan using QuickScan+ technology—only 6.7 microsieverts of exposure!	Yes, without question. My practice is light years ahead of where it was before I got my first machine in 2008. I always tell newbies, "Just wait 'til you see what you don't know you've been missing!"	Three myths: dose too high (it can actually be lower), cost too high (it's a manageable investment that is in the patient's best interest), learning curve too steep (educational resources and research are increasingly available).	Yes, without question. The advantages far exceed the disadvantages, especially now that CBCT images can be acquired with less radiation than with 2D images.	CBCT will likely be used to enhance computer-aided orthodontic treatment, probably through custom bracket and wire design and custom mechanics.
Airway evaluations, TMJ, digital models, and treatment planning for variable-torque bracket selection.	Yes! I have more confidence in diagnosis and treatment planning, which leads to better finishes.	Fear of the unknown and price of the equipment.	I think it should be, though I don't see it happening any time soon.	Cone-beam scans, intraoral scans, and clinical photography will integrate seamlessly for better diagnosis and treatment planning, making excellent digitally based orthodontics a reality.
Airway co-management, Grummons Frontal Asymmetry analysis, and pediatric facial orthopedics.	Yes, 2D vs. 3D is like lanterns vs. electricity. I don't trust 2D panos due to distortion and magnification issues; 3D offers many diagnostic advantages and treatment efficiencies, as long as you know the obstacles and risks.	Costs, the effort needed to achieve 3D proficiency, not grasping why 3D is better, and fear of missing pathoses.	Differentially, yes, for maxillo-facial surgery, implants, cranio-facial disorders, facial trauma, jaw asymmetry, TMJ intra-capsular pathosis, airway, and sleep disorders. Time will tell about the rest.	We will be able to produce an anatomically correct 3D patient with true jaws, dentition, and soft tissues superimposed on a stereoscopic capture of functional jaw motions and smile dynamics. All this with interactive communications—it just keeps getting better!
Creating SureSmile wires.	Better diagnostics = better treatment planning = better results.	Learning something new takes time, training, and implementation of systems.	After nine years of experience, I feel it already is.	CBCT will only get better in terms of diagnosis, treatment planning, and treatment!
Anatamodels to replace stone models, treatment monitoring (progress records), 3D hard- and soft-tissue simulations, and outcome assessments.	I can't work without it.	Education—knowing how to visualize, interpret, and apply the wealth of information that is provided.	As more clinicians adopt the technology and teaching programs include CBCT in their curricula, it will become a standard, similar to what we see in dental implantology.	CBCT will become the platform for virtual dental patients, in which other "tests" such as intraoral scanning, facial imaging, jaw motion capture, occlusal forces, and bite registration are integrated. This will lead the way to digital design and manufacturing of custom appliances.

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 <p>Aaron Molen, DDS, MS Auburn, WA</p>	<p>Not yet. We use it to supplement our 2D radiographs as needed, but as we replace old equipment we will move in that direction.</p>	<p>Seated, absolutely. CBCT is very sensitive to motion artifacts, and sitting reduces the amount of movement by one-third vs. standing.</p>	<p>Never from any patients or parents; just once from a local pediatric dentist.</p>	<p>Whenever I don't recognize something, which is about 5% of the time.</p>
 <p>Juan-Carlos Quintero, DMD, MS Miami, FL</p>	<p>It is my only imaging modality.</p>	<p>Sitting, due to reduced patient motion during acquisition.</p>	<p>Very seldom, once the risks and benefits are explained.</p>	<p>100% of my pretreatment scans at first; now only about 25% of my initial scans.</p>
 <p>J. Martin Palomo, DDS, MSD Cleveland, OH</p>	<p>Yes. One of my CBCT machines also offers true panoramic and ceph options. The clinical examination dictates which radiographic modality would best answer my questions.</p>	<p>I have both, and even though standing offers easier wheelchair access, I still prefer my sitting model because I find that patients are better able to keep still.</p>	<p>Only from other dentists; never by a patient.</p>	<p>Regularly.</p>
 <p>Jeff Kozlowski, DDS New London, CT</p>	<p>Yes, I use the i-CAT FLX as the only imaging modality in my main office.</p>	<p>I prefer sitting models, because they help reduce patient movement.</p>	<p>Only from the uneducated.</p>	<p>Never.</p>
 <p>Seong-Hun (Sunny) Kim, DMD, MSD, PhD Seoul, South Korea</p>	<p>Half and half. I use it for initial and final records, and the rest are taken with 2D x-rays.</p>	<p>Sitting; it's more comfortable for patients. The standing model is smaller and can be combined with panoramic radiographs, but it has a negative effect on image quality due to the shorter distance between tube and detector.</p>	<p>I occasionally get questions from patients about the risk of radiation dosage.</p>	<p>All the time. The radiologist takes my CBCT scans.</p>
<p>Commentary by Dr. Graham</p>	<p>No reason not to.</p>	<p>Sit down!</p>	<p>As Dr. K. implies, resistance is a teaching moment.</p>	<p>Comfort level is key. For me, three times in six years.</p>

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Nothing else yet, but other uses are inevitable.	Without a doubt.	It used to be radiation misinformation, but now I believe it's the cost of the equipment.	Yes, progress is inevitable.	For appliance fabrication and indirect bonding.
Virtual treatment planning through dynamic modeling and customized appliance fabrication.	Yes, I now realize the many clinical mistakes I used to make without it.	Cost, misinformation about dosimetry, and the intimidation factor of the technology.	Inevitably, now that ultra-low-dose CBCT outperforms higher-dose panos and cephs.	CBCT will replace 2D imaging, providing a single, all-inclusive diagnostic record from which customized appliances are manufactured.
I have done treatment simulations, created digital casts, and fabricated appliances.	Yes, in diagnosis, treatment planning, and patient communication. The patient understands a CBCT more easily than a lateral ceph.	The cost and the fear of buying something that could soon be obsolete.	Yes, we clearly benefit from 3D imaging. Unless magnetic resonance imaging or ultrasound make significant advances, I would expect utilization in every office.	Versatility will be key, unlike the one-size-fits-all solution that the ceph offers in 2D orthodontics. Different sizes, settings, and uses will become available throughout treatment.
Communication with patients and parents, as well as communication and marketing with other dental professionals.	Absolutely! Once doctors start treatment planning from CBCT, they will wonder how they ever worked without it!	Cost, cost, cost.	Isn't it already? How can more information for less radiation than standard 2D images be anything less than standard of care?	For world peace!
Fabrication of CAD/CAM appliances such as Invisalign, customized fixed appliances, and digital indirect bonding.	Sure! Analyzing the alveolar bone thickness and root length before starting treatment makes it more comprehensible to patients, and also helps prevent any lawsuits.	Radiation dosage! If this obstacle can be overcome, it would revolutionize our diagnostic methods.	Possibly, but there's a long way to go. Progress in hardware and imaging programs could make it happen.	High-resolution CBCT will minimize scattering, so that x-rays are efficiently converted into electrical signals and ultimately much sharper images. This will reduce the number of scans needed for diagnostic and treatment and thus reduce radiation dosage.
The sky's the limit.	Indubitably!	Given low-dose radiation reality, cost is the <i>only</i> excuse.	Nobody thought laparoscopic surgery would ever become the standard of care.	Well beyond anything we can imagine today.