GALILEOS AND CEREC

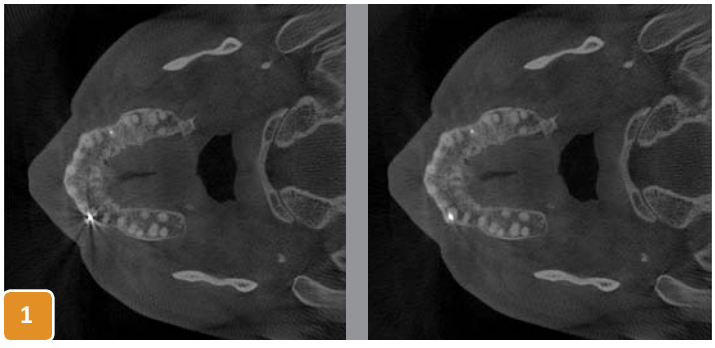
A Panacea for Providing Optimal Patient Care

BY NEAL PATEL, D.D.S.

We are fortunate to practice dentistry in a period of enormous development and growth of both CBCT and CAD/CAM. We are even more fortunate to have access to the integration of such technologies for comprehensive care. The rise of digital dentistry is led by computer-aided design and computer-aided manufacturing (CAD/CAM), allowing clinicians to image, design and mill restorations chair-side and in one visit. I have come to appreciate and rely heavily on CEREC as a restorative tool. With the introduction of Cone Beam Computed Tomography (CBCT) to dentistry, we have observed amplification in our diagnostic ability.

The advent of CBCT provides an opportunity to provide an objective assessment based solely upon results of the 3-D image. With the rise of technology within society, today's patients demand the most advanced dental care. 3-D diagnostic images help us guide our patients through diagnosis while increasing treatment plan acceptance, and provide increased precision in dental therapy. The integration of CBCT diagnostics with CEREC CAD/CAM and other objective data from biometric instrumentation from BioResearch Assoc. Inc. gives us an opportunity to formulate a definitive treatment plan with a common goal: optimal oral health. The Biometric instrumentation provides clinicians the opportunity to evaluate

» Dr. Neal Patel and the GALILEOS



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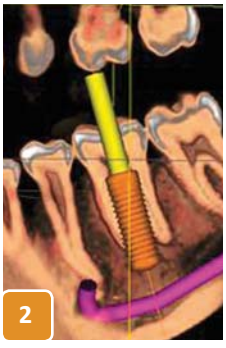

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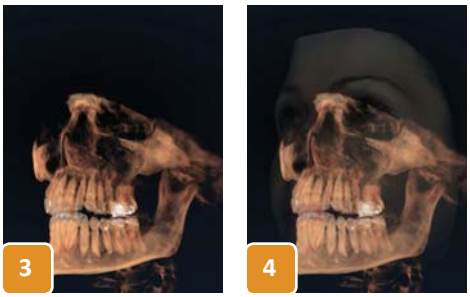
dysfunction in the temporomandibular joint, the craniofacial musculature and the overall stomatognathic system. Use of Joint Vibration Analysis (BioJVA) and Electromyography (BioEMG III), linked with Tekscan's T-Scan III computerized occlusal analysis system all provide unparalleled ability in evaluating patients with TMD and comprehensive diagnosis of the stomatognathic system. The combination of Sirona's 3-D GALILEOS CBCT imaging, CEREC CAD/CAM, and BioResearch Biometric Instrumentation provides the ultimate opportunity for optimal oral diagnostics and treatment.

I have been practicing for three years, and was fortunate to have GALILEOS CBCT by Sirona on day one. My perspective may be skewed and my preference for GALILEOS obvious, but my excitement for 3-D Imaging by Sirona grows with each day. My experience with GALILEOS has been an evolutionary process. Three years ago, it provided a 3-D image for diagnostics. Since, the images have improved in clarity and resolution thanks to constant improvements in reconstructive algorithms and continuous updates in software (Galaxis). This software has evolved from providing the essential diagnostic tools to providing integration with CEREC (GCI) for simultaneous prosthetic and surgical planning. New additions include a vast Implant Library with abutments, volumetric clipping, a metal artifact reduction (MAR) algorithm for improved imaging quality for our heavily restored patients, and finally the Integrated Face Scanner (IFS) for GALILEOS Comfort (Figs. 1, 2). The combination of GCI and the IFS provide us a complete Virtually Integrated Patient (VIP) (Figs. 3-6).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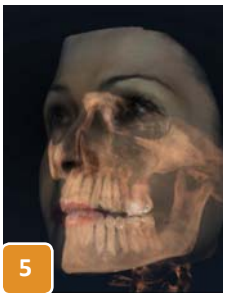
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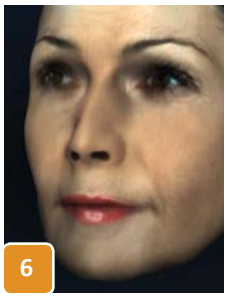
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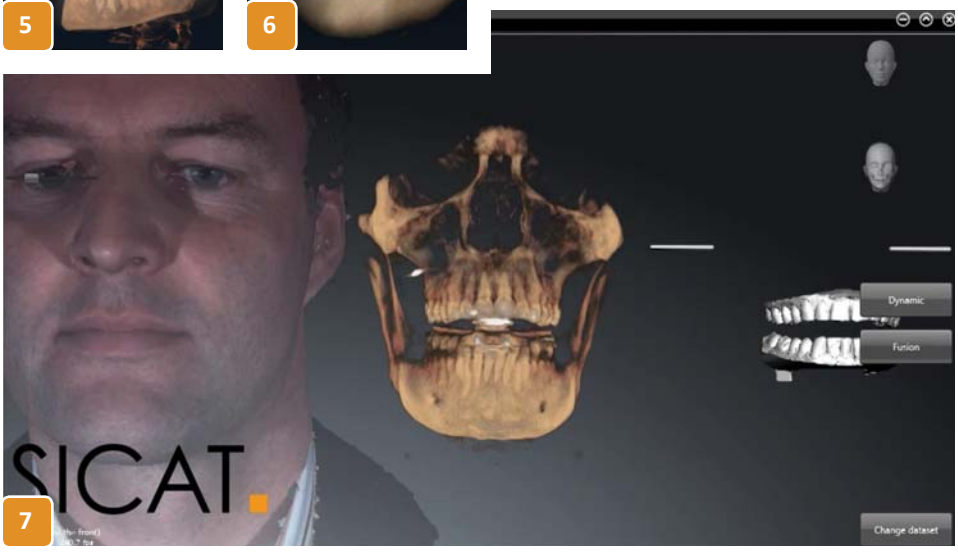

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The VIP is a Sirona concept that allows patients to identify themselves and their condition using a rendering of their own face, rather than a two-dimensional X-ray (Fig. 7). The combination of 3-D X-ray with an image of the patients' own faces helps them to understand their dentist's suggestion more quickly, and potentially leads to higher acceptance of proposed therapy. The treatment modalities have evolved to include traditional surgical guides, GALILEOS/CEREC Integration surgical guides, and now centrally milled guides, Optiguide by siCAT.

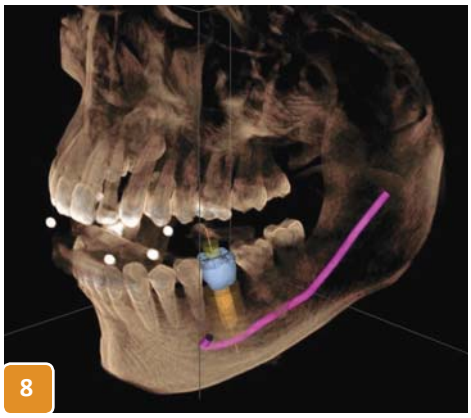
In my practice, a routine new-patient exam may include a GALILEOS CBCT scan. This is the foundation of my examination process. The Galaxis imaging software by Sirona is specifically tailored to enhance dental workflow. There is a significant reduction in our new-patient exam process time due to the comprehensive nature of the data within the CBCT scan. The combination of bitewing X-rays and CBCT allows diagnostics for all facets of dentistry: Restorative, periodontics, orthodontics, oral surgery, endodontics and implantology are all defined by one scan with Sirona's GALILEOS CBCT.

To help us understand the implication of having such technology at our disposal, let us consider a virtual patient who presents for routine dental care. Our patient Jane Doe presents with the history of routine preventative and restorative visits to a previous dentist. Her treatment history includes a bridge with endodontic treatment on the distal abutment tooth #31 and an edentulous

site at tooth #19. She presents with the anticipation of a routine cleaning, but does have a chief complaint of a sore jaw and occasional pain on the lower left. She mentions morning headaches, daytime fatigue and knows she snores at night.

For many of us, Jane is a routine Monday-morning new patient. We customarily provide a comprehensive exam using conventional 2-D diagnostic images, periodontal and restorative charting, and a review of clinical findings. Despite the fact that we may share common conclusions during our examination, the variation in treatment plans available to our patient Jane are more dependent on the experience and treatment philosophy of the dentist. We act on mostly subjective data during the evaluation and provide the best care each of us, individually, is capable of. Think about how Jane's treatment would be managed in your practice today. With advanced instrumentation, would you see an improvement in workflow or diagnostic capability? Or would you even perhaps change your treatment plan altogether? Let us see:

Initially, we evaluate our CBCT scan to give us an understanding of Jane's initial presentation (Fig. 8). Similar to panoramic imaging, this "bird's-eye" view is critical during the new-patient exam to help us prioritize Jane's treatment needs. Often, clinicians get hung up on "filling the hole." Sirona 3-D imaging provides a roadmap to comprehensive diagnostics. Jane's bridge, despite being asymptomatic, presents with a large periapical radiolucency. We suspect a root fracture from the endodontic post and note that #31 has a poor long-term prognosis, even with retreatment (Figs. 9, 10). Our discussion with Jane includes extraction of #31 and treatment planning for two implants at #30, #31 and the edentulous site #19 (Fig. 11). GALILEOS and CEREC Integration allows perfect case presentation and treatment planning on the first appointment. This creates a heuristic approach and facilitates proactive treatment in extracting #31 with grafting in preparation for implants. Remember, Jane is asymptomatic at #31, but with 3-D imaging for diagnostics and treatment presentation purposes,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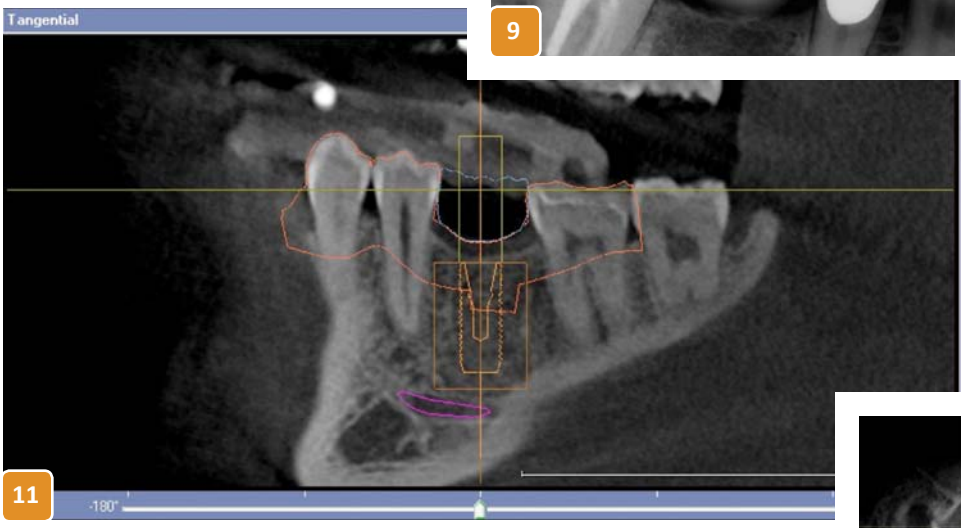

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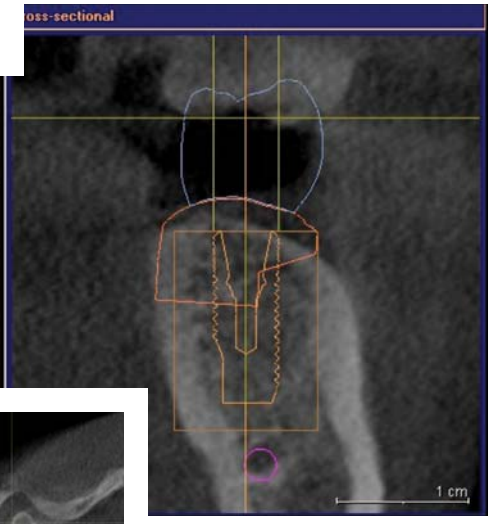

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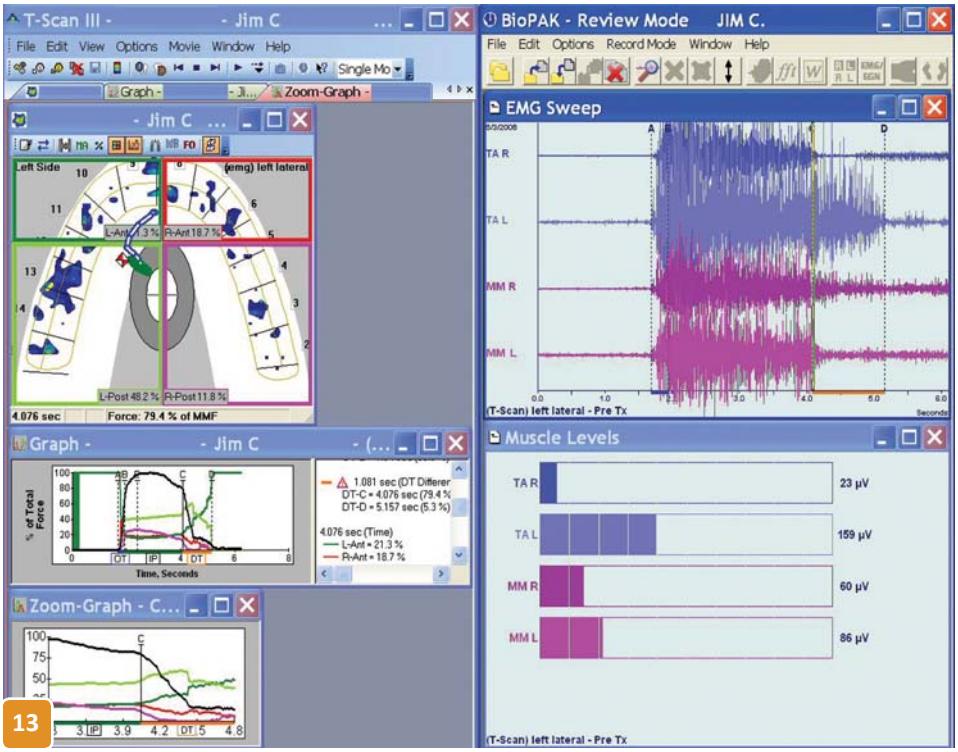

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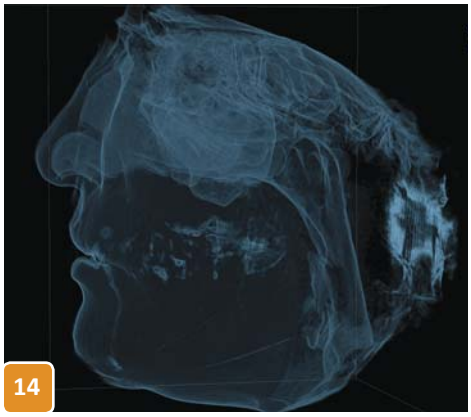
such treatment is readily accepted. After proper management of site #31, a new CBCT scan is obtained for evaluation of bone fill and after consideration of IA nerve we recommend guided surgery for precision and enhanced safety. For guided surgery, we simply obtain a full arch CEREC optical impression. With this data, we can prosthetically plan our implant treatment using CEREC software. In addition, we have the ability to transfer this data through CEREC-Connect and rapid-prototype, an SLA model through Sirona Infinident. With siCAT Optiguide, there is no need for impressions. The digital data allows Sirona and siCAT to fabricate a surgical guide using a pure digital pathway for guided implant dentistry. Once surgical therapy has been provided, the use of CEREC allows for complete control from inLab abutment fabrication to chair-side restoration.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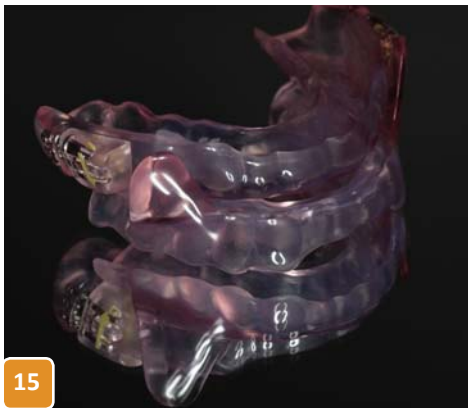
Evaluation of CBCT data allows us to evaluate the TMJ and relative position of the condyle (Fig. 12). From this hard tissue imaging, we can assess condylar remodeling and degeneration. In combination with Joint Vibration Analysis (BioJVA) we rule out joint pathology. With CBCT we are able to confidently rule out overall maxillofacial pathology and confirm health. Her chief complaint of soreness and pain on the lower left is further evaluated and we determine that her symptoms do not stem from infection or pulpitis. Using BioEMG and T-Scan linked, we note objective data within BioResearch BioPAK software that indicates elevated masseter muscle activity related to excursive interferences. Jane's initial 1.081-second left-lateral disclusion time was reduced to 0.266 seconds by removing specific known occlusal interferences in lateral movement as identified by T-Scan. After adjustment, both masseter muscles show large reductions in their levels of activity at the start of disclusion. BioEMG and T-Scan allow us to objectively confirm the results of equilibration. Such reduction in muscle activity promotes relief of Jane's non-specific pain on the lower left (Fig. 13).

Finally, using CBCT data, we can evaluate the anatomy of Jane's airway to help us understand if she could benefit from a mandibular advancement splint (MAS) (Fig. 14).. Her symptoms of morning headaches, daytime fatigue and snoring may be obvious signs of obstructive sleep apnea (OSA), but they are subjective findings. The evaluation and study of Jane's airway show a narrowing near the base of the tongue and opens the opportunity to discuss Jane's options. Defining the anatomical limitation does not allow us to diagnose OSA, but can certainly be used to screen patients for further evaluation. Recommendations are made for either an ambulatory sleep test device or full in-lab polysomnography to evaluate OSA objectively and confirm diagnosis with a physician. Jane is informed regarding her treatment options (MAS, CPAP or surgery) if positively diagnosed

with OSA. She is also informed that should she select the MAS, her dental treatment needs to be completed prior to fabricating her oral appliance. If Jane proceeds with an oral appliance, such as a SomnoDent (SomnoMed) (Fig. 15), we are able to titrate the appliance using CBCT imaging to objectively quantify the increase in airway volume by scanning Jane with the appliance in place. Effective management of OSA improves both the quantity and quality of life as proven in multiple studies.

Consider the treatment that we have proposed for Jane in my practice. How would it compare if Jane presented



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in your practice? Regardless of your treatment plan for Jane, the journey of getting from point A to point Z would certainly be different and most definitely more enjoyable using Sirona's GALILEOS CBCT and CEREC CAD/CAM with BioResearch's Biometric Instrumentation.

We define our practice by the experience our patients receive. The heuristic approach to dental care is most effective when we present our clinical and diagnostic findings objectively, and this is readily provided when using GALILEOS CBCT imaging. 3-D digital dentistry gives us an opportunity to elevate our therapeutic and treatment modalities, and often results in the best dentistry. ❖

For questions and more information, Dr. Patel can be reached at nealpateldds@yahoo.com.

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