DENTAL CT SCANS

Vol. 2, October 2004

APW Dental Services, PC • 34 East 62nd Street, New York, NY 10021

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3D CONE BEAM VOLUMETRIC TOMOGRAPHY

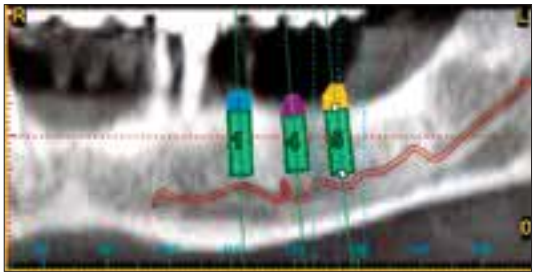
APW: New Features, New Services, New Update

New technology. We are pleased to announce that APW will soon install a new 3G (third generation) cone beam volumetric tomography (CBVT) scanner that will revolutionize our imaging. This new technology utilizes a 12-bit image intensifier that displays 4096 shades of gray as opposed to the current 256 shades captured by our 8-bit. You will immediately see the difference in greater clarity and greater accuracy. Patients benefit from scan time being reduced from 70 to 30 seconds, and the already low-dose radiation will be reduced by 4 to 5 times. We expect the new machine to be installed by year's end.

Strategic Partners. APW has partnered with Biomedical Modeling, Inc., Boston, MA, who is the leader in creating 3D anatomically accurate stereolithic biomedical models. These models have a wide range of applications and are used for pre-surgical treatment planning for conjoined Siamese twins; enable accurate anaplastic prostheses to be manufactured for trauma and cancer victims; to repair congenital defects; and now, for surgical guides for dental implant placement based on APW CBVT dental scans. BMI has partnered with the Marotta Dental Studio to fabricate surgical guides from these BioDental™ Models.

Services. Our cone beam studies are used for many purposes that include: dental implants, TMJ (both open and closed), impacted teeth, craniofacial abnormalities, pathology, mixed-dentition analysis, mid-palate implants, and more. Since so much information can be learned from these scans when compared to dental X-rays or panorexes, we encourage cone beam tomographs for interim diagnoses during mid-orthodontic treatment, for chronic endodontic lesions, or after a patient has already had a diagnostic scan in the same jaw at APW and post-treatment sites, such as healing sockets, ridge augmentations, and sinus grafts need to be evaluated. To utilize this mid-treatment service, we offer a special fee of $125 with the understanding that a report will only be provided for a single prescribed site. Call for more information.

SimPlant® Master Site. APW is the only U.S. dental radiological lab that is also a SimPlant® Master Site. In addition to NewTom® 8x11" films or glossy prints, we provide CT scans in SimPlant® Versions 7, 8, and soon-to-be-released Version 9 that renders sagittal slices through 3D images.



DRIVEN BY EXCELLENCE?

MIS has something just for you!

The Abrahami Drill Guide System provides an innovative approach to enable the dental surgeon to prepare 2 or more implant sites with optimal spacing, angulation & parallelism.

Spacing

Permits the surgeon to locate the sites for the implants with the desired intra-implant distance.

The distance between implants and the bucco-lingual direction would have to be adjustable.

Angulation

Enables the surgeon to prepare sites in the most advantageous bucco-lingual angle possible within anatomic limits and restorative contours.

Parallelism

Guides and ensures complete vertical Parallelism between the implants.

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U.S. patented 5833693

Note: the Abrahami kit can be used with all implant systems.

MIS

For additional information about our accessories & implant system call MIS Implants customer service at 1-866-797-1333 or E-mail us to: mis.service@verizon.net

www.mis-implants.com

WITHIN CANAL

Guest Editorial: An Ounce of Prevention

by Stuart C. White, DDS, PhD
Professor and Chair, Oral & Maxillofacial Radiology,
UCLA School of Dentistry

Dental diagnostic imaging has grown dramatically in recent years. Digital imaging has been used for intraoral use for two decades and now panoramic and cephalometric views are readily available. These techniques have brought "instant imaging" and dose reduction into the dental operatory. The rapid adoption of implants by the profession has contributed to the development of another rapidly evolving technology: cone beam volumetric tomography (CBVT). This imaging technology provides 3D and cross-sectional views of the jaws in any user-defined plane. The thinness of the sections, and thus the clarity of the anatomy revealed, far exceeds that available from conventional tomography. CBVT images can be optimized to display information critical for many branches of dentistry when they are made by experienced individuals. The cross-sectional views from these scans provide information for pre-surgical implant treatment planning not available on periapical or panoramic images such as the width and porosity of alveolar bone, whether there is a lingual undercut of the mandibular alveolar ridge, the buccal/lingual position of the mandibular canal, or whether the buccal or lingual alveolar plate has been compromised by previous infection or incomplete healing following an extraction. CBVT scans are readily available across the country and provide an exposure dose that is approximately 5% of a conventional CT examination.

In recent years I've been involved in a number of implant cases as an expert witness in which there has been an adverse patient outcome that may have been avoided by proper treatment planning, including cross-sectional imaging. What has been particularly eye opening in these cases is the sophistication of both the plaintiffs' and defendants' attorneys. They are acutely aware of the benefits of CBVT imaging technology, including particularly the use of thin panoramic-like images to locate and mark the location of the mandibular canal. In my opinion, the use of CVBT or conventional CT is rapidly becoming the standard of care for implant placement. I believe that it is both prudent and in the best interest of both patients and their dentists to make cross-sectional imaging a standard part of pre-surgical treatment planning for implants. Surely this is a situation where an ounce of prevention is worth a pound of cure.

Figure 1. Craniofrontal Dysplasia. Premolar erupting into first molar furcation.

Figure 2. Mixed dentition of a patient (age 11) with achondroplasia.

Figure 3. Transaxial view of erupting maxillary canines and deciduous mandibular molars.

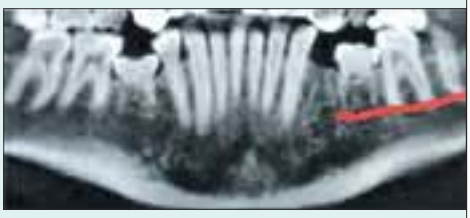

Figure 4. Replacing mandibular left "E" with an implant.

Figure 5. Measurement of 8.3mm to nerve.

Craniofrontal Dysplasia: Complex Problems

The patient, a 19-year old WF suffers from Craniofrontal Dysplasia which is characterized by delayed closure of the space between the bones, premature closing of the coronal suture, a protruding mandible, an elongated brow bone, and a high-arched palate. She has had multiple surgical procedures to treat this condition (see panoramic first page) and is currently in orthodontic treatment.

CBVT dental scan technology enabled the surgeon to determine the quantity of ingrowth of bone that has occurred over and around fixation plates and screws. In addition, these views helped determine the 3D relationship of tooth #13 to the trifurcation of tooth #14. The findings indicated that the premolar #13 had erupted into the trifurcation of tooth #14 (Figure 1).

Achondroplasia: Affects 1 in every 25,000 births

Achondroplasia occurs in all races and in both sexes, and is the most common of a group of growth defects characterized by abnormal body proportions. These individuals have arms and legs that are very short while their torsos are more nearly normal in size. Achondroplasia is caused by an abnormal gene located on one of the chromosome 4 pair. However, in more than 80% of cases, achondroplasia is not inherited but results from a new mutation that occurred in the egg or sperm cell forming the embryo. When this occurs, the parents are normal-sized.

This patient in Figure 2 (age 11) was referred to APW because the mandible was growing faster than the maxilla. The CBVT dental scan helped analyze the mixed dentition in order to facilitate the orthodontic/surgical treatment plan. Tooth-by-tooth, inter-arch transaxial views, accurately represent all developing and erupting teeth in a mixed dentition as seen in Figure 3.

Retained Deciduous Teeth and Implants

Healthy dental patients who do not suffer from periodontal disease do not automatically have enough bone to easily place a dental implant. For example, patients who are congenitally missing the maxillary lateral incisors may not have enough bone to place a dental implant without the need to augment the edentulous ridge.

In this example, Figure 4, the dentist planned to remove the left deciduous molar and place two implants in the edentulous site, since #21 was already missing. A CBVT scan revealed that the mental nerve was at the apex of the mesial root and the mandibular nerve was more coronal than normal.

Figure 5 displays a measurement within the furcation (toward the distal) where it would be reasonable to insert an implant. There is only 8.3 mm from the coronal crest to the superior aspect of the mandibular nerve. Utilizing CBVT aids in precise treatment planning to help determine site limitations, the appropriate length and width of the dental implant, and which implant system may be optimum for a specific site. Rather than starting an implant surgery and discovering an unforseen difficulty, CBVT reduces the chance of an unexpected finding.


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New Sonicare Elite®
Experience next generation patented sonic technology:
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• Improved cleaning power — recent studies show that Sonicare Elite
• Better beyond the bristles — Sonicare Elite is clinically proven in vitro to
• Even gentler — Sonicare Elite is four times gentler on dentin than the
• Most preferred — Sonicare Elite is preferred over Braun Oral-B 3D
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BioDental™ Models and Drill Guide

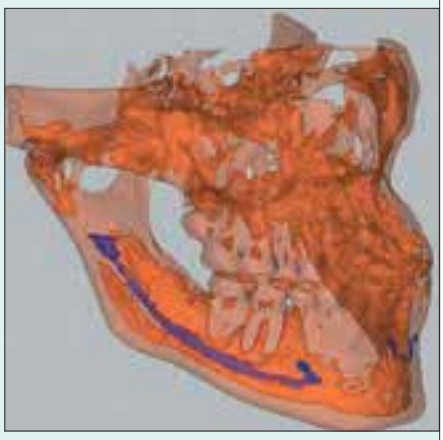

FIGURE 6. MASKS, LIKE THIS ONE, ARE CREATED BY SOFTWARE FROM THE CBVT DENTAL SCAN DATA.

FIGURE 7. A LASER BEAM SWEEPS LAYER-BY-LAYER USING A UV LIGHT TO CREATE THE BIOMODEL. THIS DEPICTS THE HEAD OF A FEMUR.

Using SimPlant® software, a dentist could always have either a tooth-born or tissue-born surgical guide made from an APW dental scan by Materialise. However, many barriers existed to this process. Very few surgeons actually have the SimPlant® software and Materialise was not comfortable making bone-born stents from CBVT data sets. For this reason, APW did not promote surgical guides. This will change when we install our new 12-bit scanner. But there is no need to wait.

APW has been working with Biomedical Modeling, Inc., located in Boston and Albany, to make anatomically accurate BioDental™ Models from CBVT dental scan data for dental implant placement. BioDental™ Models simplify planning safe implant placement. BMI has forged a working associateion with Marotta Dental Studio to fabricate surgical drilling guides from BioDental™ Models. The entire BioDental™ Model System can be produced with a turn around time of 10 to 14 days.

Here's how it works. APW scans the patient and sends the CBVT dental scan data via the Internet to BMI. A skilled technician meticulously differentiates hard tissue from soft tissue via a masking process, and combines these masks to produce a 3D computer rendering shown in Figure 6. A UV laser and photopolymer resin are used to build a stereolithographic Biomodel layer-by-layer (Figure 7). Support material is cleaned off, resulting in an anatomically accurate BioDental™ Model.

Options enable the BioDental™ Model to meet your specific requirements; the most common is depicting the mandibular nerve canal in red (Figure 8). Figure 9 demonstrates an edentulous BioDental™ Model. BMI also produced a gingival soft tissue BioDental™ Model for this case which is visible below the tooth wax up (Figure 10). Marottal Dental Studio completed the BioDental™ Model System by fabricating the custom stent which aided the surgeon in accurate implant positioning and angulation (Figures 11, 12 and 13) and significantly reduced chair time needed to treat the patient.

FIGURE 8. MANDIBULAR NERVE IN RED IN BIODENTAL™ MODEL.

FIGURE 9. EDENTULOUS BIODENTAL™ MODEL.

FIGURE 10. ARTICULATED WAX-UP WITH SOFT-TISSUE MASK.

FIGURE 11. SURGICAL GUIDE WITH METAL TUBES FOR IMPLANTS.

FIGURE 12. SURGICAL PINS WITH GUIDE

FIGURE 13. SURGICAL PINS

(Figures 6-13 Courtesy of BMI.)

Strategic Partners

APW is partnering with Biomedical Modeling Inc. (BMI), the leader in creating 3D anatomically accurate stereolithographic Biomodels. BMI's newest product, the BioDental™ Model System provides dentists an advanced implant planning and placement technology that does not require you to invest in and learn complex computer software. This new dental technology works with all implants. Based on APW Cone Beam Volumetric Tomography dental scans, BioDental™ Models offer intuitive implant planning. The complete system includes surgical drilling guides fabricated on BioDental™ Models by Marotta Dental Studio to ensure accurate implant placement.

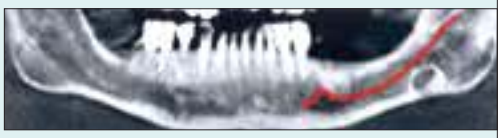

FIGURE 14. RADIOLUCENCY DISCOVERED IN ANGLE OF MANDIBLE ON LEFT SIDE.

FIGURE 15. AXIAL VIEW OF RADIOLUCENCY DEMONSTRATING INVAGINATION INTO THE JAW.

FIGURE 16. UNIQUE CORONAL VIEW OF CONDYLES. RADIOLUCENCIES SEEN IN LEFT CONDYLE.

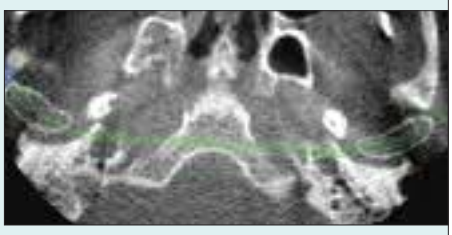

FIGURE 17. AXIAL VIEW OF DEMONSTRATES HOW SAGITTAL VIEW OF CONDYLES IS MADE.

Differential Diagnosis for Bony Radiolucency

During the routine CBVT dental scan for dental implants, a radiolucency was noted (Figure 14) in the left posterior mandible below the inferior alveolar canal. The differential diagnosis was either an intra-osseous tumor or cyst, or a salivary invagination cyst (known as Stafne Cyst). Was a biopsy necessary to confirm the diagnosis? Or was there a less invasive diagnostic choice with less post-operative sequelae for the patient?

Scrolling through axial views demonstrated that the radiolucency was most likely an invagination of the soft tissue into the posterior body of the mandible, which is characteristic of a Stafne Cyst. As a result, an intraosseous biopsy was not needed. Rather, these lesions can be observed at periodic intervals to note if any changes occur.

Unique Applications of Cone Beam Tomography

One of the advantages of cone beam volumetric tomography (CBVT) and having dental professionals generate the reports from the reconstructed raw data is that unique views can be created for specific clinical conditions. For example, Figure 16 depicts how we create the unique coronal view (anterior-posterior) through the condyle. Medical CT scans and tomographic units only render the traditional sagittal or lateral views of the TMJ complex. In addition to both sagittal and coronal views of the TMJ, APW can provide images from different angles and 1mm slices through the length of the condyle (Figure 17).

Another unique view that CBVT scans provides is through the mid-palate. An example is seen in Figures 18-19 which demonstrates (in different cases) whether or not there is enough bone present in the mid-palate to have a dental implant inserted to assist in orthodontic treatment. One-millimeter slices are made from anterior to posterior, so the surgeon can determine the best site, if possible, for an implant.

Our doctors are available to discuss your CT studies and complex treatment plans.

Please call to arrange a phone conversation.

FIGURE 18. CORONAL SLICES GIVE ACCURATE IMAGES OF AMOUNT OF BONE IN THE MID-PALATE FOR A DENTAL IMPLANT.

FIGURE 19. PALATAL IMPLANT FOR ORTHODONTICS. (PHOTO COURTESY OF MAROTTA DENTAL STUDIO).

We value the newsletter's sponsors and urge our readers to contact them for more information.

The Ultimate Implant Experience

The Astra Tech Implant System has been getting quite a lot of attention lately. After all, it looks and acts totally unlike other implant systems. Why? Well for one, it is the only third generation implant system specifically designed for simplicity, versatility and user-friendliness. Its revolutionary Conical Seal Design™, for instance, gives you the option at the critical moment to submerge (two-stage) or not submerge (one-stage) the implant.

Microthread™ significantly reduces stress levels to help preserve cortical bone.

The results are expanded treatment options, more predictable outcomes, improved esthetics and excellent tissue response. What's more the CSD concept has turned the implant pillar into a pillar of strength, capable of withstanding greater biomechanical forces and eliminating the loosening and broken screw syndrome.

The Astra Tech Implant System also includes a variety of unique and creative product developments all designed to raise your implant experience to a new level. Products like the Tiger Drill™, Cast-to-Abutment™, Direct Abutment™, patented TiOblast™ surface and Fixture MicroThread™ design.

TiOblast™ surface dramatically improves bone/implant interlock.

The Fixture MicroThread™ ST is the only implant in the industry specifically designed to meet the unique challenges of single tooth replacement. Needless to say, backed by our Lifetime Warranty, we think the Astra Tech Implant System will make a brilliant addition to your practice.

Conical Seal Design™ increases implant pillar stability, eliminates the need for radiographic verification and the loosening and broken screw syndrome.

We're changing implant dentistry. Forever.

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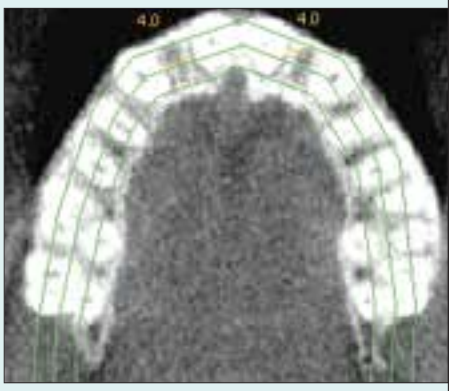

FIGURE 20. AXIAL VIEW.

FIGURE 21. PANORAMIC VIEW.

To Treat or Not To Treat

Obvious and apparently simple cases are not always the easiest ones to treat. Nuances appear when we least expect them and all of our clinical skills may be taxed when we least expect to call in the reserves. Figures 20 and 21 demonstrate the axial and panoramic views of congenitally missing lateral incisors. When measurements are made at roughly the CEJ, there is only 4mm between the roots of the canine and central incisors in both the #7 and #10 sites. While the patient and orthodontist want implants inserted in these areas, do accurate 1:1 three-dimensional images yield valuable information that may affect how you treat this case? You be the judge.

Computer Program Renders Different Views

Once a CBVT scan is taken, the pixels common to all data generated by a computer are converted by what is known as a primary reconstruction into a series of 85 axial slices. At this point, the axial slices are scanned for pathology. Next, a secondary reconstruction is made into the usual formats of panoramic and transaxial views. (Panoramic images correspond to coronal views, and the transaxial images correspond to sagittal views). While APW creates reports in the customary panoramic and transaxial views, unique views are generated when certain pathologies exist. Figures 22-26 are selected images APW created when an oral surgeon needed to view the mandibular nerve relative to an impacted #17 and the tooth's relationship to the distal of #18. Notice the mesial-buccal to distal-lingual slices in Figure 25 and the mesial-lingual to distal-buccal slices in Figure 26. Each renders a different perspective of this impacted tooth, the nerve, and the follicular cyst associated with the tooth.

APW is happy to provide different views of specific entities upon request or at our own discretion.

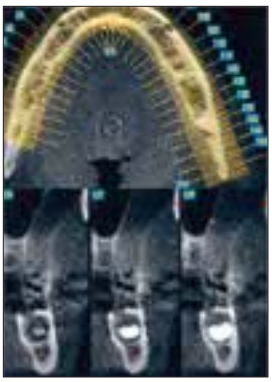

FIGURE 24. 1-MM. SAGITTAL SLICES.

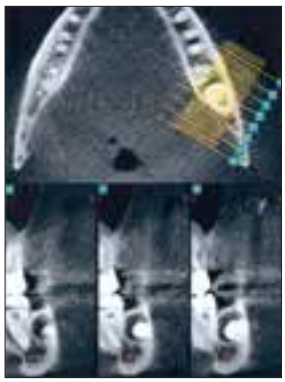

FIGURE 25. 1-MM. MB-DL SLICES.

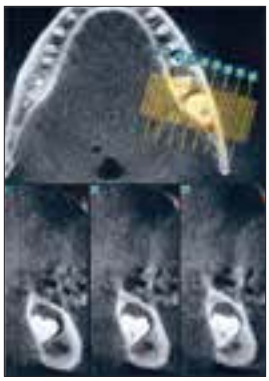

FIGURE 26. 1-MM. ML-DB SLICES.

DICOM, APW, and SimPlant® Conversions

Being able to place images into DICOM format permits the output of different medical and dental radiological machines to be converted into many types of familiar and useful software. With DICOM, APW converts NewTom® CBVT scans into any version of SimPlant®, which we do easily each day. In addition to the scans APW converts into SimPlant® taken in other NewTom® radiological labs, we are able to convert conventional DentalScans taken in medical facilities on GE, Siemans, and Hitachi medical scanners, into versions 7, 8.0, and the upcoming 9.0 of SimPlant®.

So what is DICOM? DICOM is an acronym for Digital Imaging and Communications in Medicine. The DICOM standard describes all of the detailed functional specifications permitting one software program to use another. Because programmers use these standards in developing their software, medical imaging is universal around the world. This ensures that digital images taken in one medical facility can be transported to, and reformatted by, another facility around the corner or half-way around the world.

Mandibular nerve canals always marked in red; measurements upon request.

FIGURE 22. IMPACTED #17.

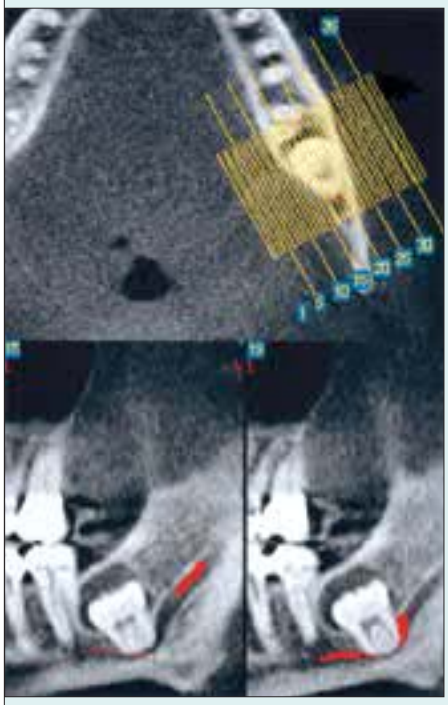

FIGURE 23. 1-MM SLICES BUCCAL-LINGUAL.

FIGURE 27. NEWTOM® 9000 SCANNER.

UPCOMING EVENTS:

October 6, 2004

"CT Scans for Esthetic Implant Placement"
Dr. Alan Winter
North East Periodontal Study Group
Sheraton at Woodbridge
Iselin, NJ

October 13, 2004

"The ABCs of CT Scans in Dentistry"
Drs. Winter and Pollack
NY County Dental Society
6 East 43rd Street
New York, NY

October 22, 2004

Exhibitor
NESP Fall Meeting
NY Marriott Marquis Hotel
1535 Broadway
New York, NY

April 14, 2005

"Newest Advances in CT Scans."
Dr. Alan A. Winter
2nd Dist Dent Society
Ft. Hamilton C.C.
Brooklyn, NY

MEET DR. HERBERT H. FROMMER

Generations of NYU dental students have learned radiology from **Dr. Herbert H. Frommer**. What many do not know is that after attending Columbia University, Herb received his DDS from Columbia in 1957. Herb was in the Naval Reserve and before settling into NYU, taught at what was then Seton Hall College of Dentistry, and is now UMDNJ. Herb joined the faculty of NYUCD in 1969 and became a full tenured professor in 1992. He is currently Professor and Director of Radiology, and Diplomate of the Board of the American Academy of Oral & Maxillofacial Radiology. APW is proud of Herb's accomplishments and thankful he is part of our team.

STUDY CLUBS AND DENTAL ORGANIZATIONS

Call APW Dental Services to arrange for a lecture to your study club or dental organization. Learn how easy it is to incorporate the rapidly changing world of computed tomography into your restorative/cosmetic or specialty practice. Understand how axial and transaxial 3D views take the guesswork out of complex diagnostic problems. Discover how 12-bit technology, BioDental™ models, and surgical guides will take the worry out of surgical planning for dental implants.

Contact Lisa Koenig at 212-838-8302 or toll free at: 1-888-APW-XRAY.

CONVERT MEDICAL CT AND NEWTOM CBVT SCANS TO SIMPLANT®

APW can convert medical CT scans, DentaScans, NewTom 9000 and all other cone beam volumetric tomographic scans to SimPlant® in versions 7, 8.0, and upcoming 9.0, with NEXT DAY Service.

Please call our toll free number for details.

1-888-APW-XRAY

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Demonstration in your office

Please contact APW's executive administrator, Lisa Koenig, to arrange an in-office demonstration of our services. We will demonstrate how SimPlant and NewTom tomography will help you give the best care possible for your patients.