Conventional two-dimensional radiographic procedures are routinely used for oral and maxillofacial diagnostic tasks. However, these procedures fail to provide information in the third dimension, often necessitating use of advanced imaging modalities. Routine use of computed tomography and magnetic resonance imaging is limited by the relative inaccessibility of the imaging modality to the dental surgeon, the high cost and radiation burden of the examination, the need to immobilize the patient for long periods of time, and the potential for artifact generation, among other things. These imaging modalities provide three-dimensional information thereby allowing multiplanar examination of the region of interest. Conventional tomography is also used for a variety of diagnostic and treatment planning tasks and is often used by dentists due to the lower cost and radiation exposure, and greater accessibility.

Conventional tomographic image acquisition employs different configurations of motion of the x-ray source. State-of-the-art conventional tomographic units such as the OP-100, Scanora and the CommCAT employ a variety of tomographic motions ranging from linear to more complex configurations such as hypocycloidal, tri-spiral or figure-of-eight. The more complex the motion, the better is the blurring of superlying anatomy. Linear configuration of motion involves the generation of linear streak artifacts, which are effectively removed by units employing complex motion sequences. The amplitude of travel of the x-ray source determines the slice thickness.

**Implant diagnostic imaging using tomography**

It is generally recommended by the oral and maxillofacial maxillofacial radiologists that some form of cross sectional imaging be employed for evaluation of potential implant sites. Unfortunately, panoramic images are used by a majority of surgeons for implant treatment planning purposes. Numerous inherent drawbacks of this imaging modality such as distortions, magnifications, artifacts and ghost images limit the diagnostic value of panoramic images.

*continued on page 8*
President's Message

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Editor's View

Putting this issue together was fun and rewarding. I enjoy the process of watching it come together and take great pleasure in the phone calls and emails with members’ comments and suggestions. Summer is a busy time for all the labs, but I hope each of you will set aside some time for going somewhere or doing something special. I am looking forward to seeing everyone in Denver!

Camille Mayorga  editor@aadmr.com

Happy Belated Birthday Mr. Arthur Quint!

Born  May 28, 19__

It should be stated that Mr. Quint would be considered the most senior member of our organization. Well seasoned and still competent and feisty, he leads our industry in formatting radiographic laboratories, supplying all of us with the latest state-of-the-art equipment, and a service department that has always stood by the Quint name.

Mr. Quint supported us and knew us when we were just a small group of laboratory owners known; back then, as CORLA (California Oral Radiographic Laboratories Association). He graciously acquiesced to our request of using his Los Angeles based office as a meeting place for the organization. He even provided us with coffee and doughnuts! Remember that! All you older guys!

Oh-and how many of you have that old Quint Sectograph?
Yes, the old Quint “Maytag”, that’s what the Sectograph is. Never any “down time”. That old machine is a workhorse. Still required by most labs and still being improved to this day. Every time I turn around Mr. Quint has added something useful to that old machine of mine. Thank you Mr. Quint for NOT putting a motherboard in your Sectograph. Oh yes, there is one thing about that Old Faithful machine—about every two years or so the darn light burns out in the collimator and I have to change the bulb. But that’s about it!

How is it that you look so great? Someone told me that it was the Gefil Tefish. I asked your wife and she told me that you don’t even like Gefil Telfish. Must be that bagel you eat every morning.

Well, I hope you had a wonderful birthday and I didn’t want to take the liberty of telling everyone your real age. I think that’s up to you. But, your wife spilled it to me the other day. You are amazing!!

Sincerely Your Friend,
Diane Yamasato
Expenses for solo dentists have consistently increased since 1994. The graph above shows dental specialists expense in 1998 was an average of $257,900.00.

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**AADMRT Welcomes 7 New Members**

from The Wilson Radiographic Centers of Houston Texas:

- Kim Franks
- Randy Sailors
- Kim Haynes
- Lori McConathy
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**Arizona to Launch Dental School**

The Arizona school of health sciences received approval to open a school of dentistry and oral health in Mesa. The school will start its first class of 75 students in the fall of 2002.

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**Kodak Builds Image Quality, Processing Flexibility Into New Extraoral Film**

ROCHESTER, N.Y., February 19—Eastman Kodak Company announced today two new extraoral dental films that achieve a new standard for image quality while accommodating a wider range of processing conditions.

*Kodak Ektavision G* Extraoral Film is a high-contrast film ideal for visualizing detail of teeth, bony structures and pathoses such as soft tissue calcifications. *Kodak Ektavision L* Extraoral Film is a wide-latitude film suitable for imaging soft tissue. “These films represent the next generation in extraoral dental film,” said David Allen, Kodak dental general manager for United States and Canada.

Laurie Carter, DDS, PhD, associate professor and director of oral and maxillofacial radiology at Virginia Commonwealth University School of Dentistry assisted Kodak in a clinical evaluation of Ektavision G Film. “It was absolutely superior to the comparison films,” reported Dr. Carter. “You could see it from across the room.”

Dr. Carter used a dry skull test to compare Ektavision G Film with two other extraoral films from Kodak: *Kodak Ektavision Imaging System Film* and *Kodak T-Mat G* Extraoral Film. She ran a series of four images using each film. “With Ektavision G Film, structures just popped out,” said Dr. Carter. “I could see subtle, paper-thin septations in the sinuses that were barely visible using the other films. I was amazed at how many more of these structures I could see.”

Dr. Carter now uses the new film to image dental patients when the previous screening has indicated the presence of pathologies. “I like a contrasty film when performing osseous evaluations,” said Dr. Carter. “Ektavision G Film is, in my opinion, an excellent diagnostic tool.”
Complex Imaging continued:

Negative vertical angulation of projection results in a grossly inaccurate depiction of primarily vertical dimensions.

Use of CT is not indicated in every case owing to the numerous disadvantages listed earlier. Besides, many imaging centers do not have an understanding of the image acquisition process for purposes of evaluating implant sites, so much so that faulty angulations of the patient’s anatomy results in the distortion of reformatted images. The procedure is very technique sensitive and requires appropriate patient positioning and choice of scanning protocols. Use of a spiral CT scanning mode employing low mAs, and a minimal number of slices help to keep the radiation exposure to a minimum.

Conventional tomography offers a convenient alternative in cases where fewer than 7 or 8 sites are being evaluated per jaw. Imaging stents are recommended for use with conventional radiography but in instances where longitudinal imaging is carried out, stents are not essential. Tooth form lead foil markers are usually recommended over other types of radiopaque markers such as stainless steel balls, cylinders etc. The lead foil from intra-oral film packets are used for this purpose. These are draped over the occlusal contours of the tooth form and usually have a long buccal arm that helps with patient positioning. In units such as the CommCAT, the model of the patient’s arch with the stent placed on it is scanned in using a flatbed scanner and imported into the software interface for interactive arch plotting. The stent with the radiopaque marker makes it possible to select the slices of interest on the template that is superimposed on the scanned in image. Alternatively, a cross-sectional occlusal radiographic survey can be used for input purposes too. The CommCAT software interface superimposes a slice selection template on the scanned in arch form image. This can be further customized to suit the diagnostic task at hand by changing the slice angles and projection geometry. Generally a cross-sectional and a longitudinal slice are obtained to correlate the anatomic landmarks and precisely determine the location of the cut. However, in the presence of a stent with a radiopaque marker such as a lead foil, a longitudinal image is not always required. The magnification factor specified by the manufacturer should be worked into any computations while measurements are made from the tomograms. Ideally, a tracing of the tomograms with a written report should be made available to the surgeon. If the imaging stent correlates well with tomographic data, it can be modified by the surgeon to act as a surgical stent. There are treatment-planning algorithms such as SurgPlan that enables limited task-based image processing, measurements and simulation of implant placement and bone graft procedures on tomograms.

Slice thickness of 1-3 mm can be selected for cross-sectional tomograms (Figure 1), depending on the imaging modality and unit employed. However, the contrast resolution on a 1mm thick slice acquired using conventional techniques is far from satisfactory. Besides, most implants are 3mm or more in cross sectional width. The use of 3-4 mm thick slices is therefore, fully justified in these cases. Conventional tomography also enables examination of isolated areas of interest unlike CT where a set of axial images of the entire jaw of interest is acquired. Other advantages of CT include the superior contrast resolution, uniform magnification, capability to view multiplanar projections and 3-D reconstructions. The use of 3-D reconstructions in pre-surgical implant treatment planning has not been shown to yield additional data and therefore is probably not warranted.
MRI is yet another imaging modality that is being actively explored for this purpose. This modality does not use ionizing radiation and multiplanar examination is possible without having to reformat images. However, the lack of specific imaging software and the high cost of the technique has not contributed to its being routinely employed for diagnostic implant imaging purposes as of today. However, there is promise of this technology being developed further to exploit its full potential with respect to the diagnostic task at hand. MR units (open 0.2T) with lower field strength have been evaluated for this purpose with excellent results. Among other drawbacks of this technique such as inability to image patients with cardiac pacemakers, aneurysm clips etc., disruption of the homogeneity of the field caused by metallic restorations resulting in artifact generation is to be contended with. However, in order for the artifact to render the image non-diagnostic, the source should have ferromagnetic properties. The majority of restorative materials used in the region do not adversely affect image generation significantly.

Recommendation of the AAOMR
The American Academy of Oral and Maxillofacial Radiology recommends the use of some form of cross-sectional imaging for implant treatment planning purposes. It is probably the most cost effective imaging technique. Advanced imaging such as CT is only recommended in instances where more than 7 or 8 implants are planned for each jaw or when grafting of the region of interest has been done. Trauma requiring reconstructive surgery in the maxillofacial region is yet another indication for using CT. Cross sectional imaging is thus becoming the standard of care in this area.

Other potential uses of tomography
Tomography is also employed in instances where pathology of the oral and maxillofacial region is suspected. This includes but is not limited to survey of impacted teeth, mostly third molars, cystic lesions and tumors that are odontogenic or centrally located in the jaws, evaluation of the temporomandibular joints (TMJs), detection of fractures etc. (Figure 2-4). Often, multiple views of the region of interest using differing projection geometry help with diagnosis. Typically, projections that are at right angles to one another are known to provide spatial information of the lesion of interest.

Conventional tomographic imaging thus continues to be routinely recommended by oral and maxillofacial radiologists for a variety of diagnostic tasks. The use of digital imaging sensors will further reduce the radiation burden of the examination as this technology continues to evolve. Limited use of advanced imaging modalities is recommended based on the diagnostic task. Recent advances in CT and MR have shown promise of their being employed for routine oral and maxillofacial diagnostic imaging purposes in the near future. Evolution of high-speed CT imaging protocols and other such modified units exploiting similar image acquisition principles is expected to contribute to lowering of the radiation burden and cost of such examinations. Collaboration of oral and maxillofacial radiology with medical radiology departments is central to developing a better understanding and catering to the imaging needs of the dentist. Access to expensive imaging modalities and image processing workstations is also pivotal to this endeavor.

Figure 1: Conventional tomogram of a potential maxillary implant site.
Figure 2: Sub condylar fracture. (Figs. 1 and 2 contributed by Craig Dial, DRT, Diagnostic Digital Imaging, Sacramento, CA)
Figure 3: Odontogenic keratocyst associated with an impacted tooth. Sagittal and cross-sectional tomograms. (Contributed by: Dr. A. Csillag DDS Dip.Oral Rad.,FRCD (C), Wilson Radiographic & Diagnostic Centres Ltd. Calgary)
Figure 4: Osteochondroma of the condyle with degenerative joint disease (Contributed by Dr. K. Abramovitch DDS MS, University of Texas-Houston)
Promotional Lab Media

By: Beverly Studer

My promotional media is quite extensive - our website was designed from our inserts that make up our brochure which is more like a coil bound book. You can view this brochure at our website www.edxi.com and note that each website page is a replication of a page in our brochure.

We have a folder with our logo, name, address and map printed on the outside. Inside we place the brochure on one side and requisitions with a fee guide on the other side. The cost of printing and assembling our brochures was fairly high. But, due to the fact that it is a fairly thick package, not just a pamphlet, I find our Doctors are more likely to hold onto it, rather than misplacing it or tossing it in the garbage. Although the information is geared towards the Dr’s, the photographs show the quality of our work, and what we do, of which the Dr. can review with his/her patient by flipping through the booklet. We also keep a copy in the waiting room. The best feeling is having the information at our fingertips, ready to distribute, when we get a new request for information on our services. It is delivered the following day, and projects the image that we are efficient as well as professional.

Would I put the money out to do it again? I would have to say “yes”.

Would I put the money out to do it again? I would have to say “yes”. I would take money away from other areas of advertising or review other aspects of the business in order to see where I could possibly cut some costs in order to fund this marketing tool.
Spotlight Lab

Halpert Dental X-Ray, Northridge, California
by: Dan Halpert

HDX opened for business in on April 1, 1976. April fools day. I thought it might be very symbolic. Most of the 1970’s were recession years in this area. The aerospace business was in the first of many down turns. I had hopes that I was not the fool, having just borrowed some money and purchased some of the equipment of a local laboratory that had just closed up due to lack of work. Twenty five years later I believe that I can say this was a good decision.

A funny thing happened on my way to my chosen career. A new and different career chose me! With a strong background in electronics and a love of photography I had my heart set on becoming a broadcast engineer. The reality was that I was not earning enough income as a freelance newspaper photographer to get through the fall semester at college. Luckily I found a summer job at a dental x-ray laboratory as a darkroom person. This was a very busy lab and all films were hand processed (1969). I was interested in the imaging as well as the professional relationship between the technicians and the referring doctors. Luckily the State of California had just announced pending legislation that would require all technicians to pass a State Department of Health exam.

The company I worked for had 5 labs and wanted to make sure that all their technicians passed the exam so they started classes for their employees. I was called upon to help them with the electronics portion of the exam. As a result of this legislation, a number of laboratory owners banded together and formed CORLA which later switched to a technician based membership and eventually became the AADMRT.

I find that I am still fascinated by imaging, photography and electronics and it is with great excitement that I find that they are merging into this field with much greater importance. 1993 was the first year that we were involved with digital photography, one of the first 2 labs to use the Kodak/Nikon DCS series cameras. In 1994
Understanding the California Rulemaking Process

By: Matt Kroona

Many people have expressed concern and or distress over the uncertainty of the requirements for Continuing Education for California Limited Permits, and the number of years we have lived with that uncertainty. I recently discover some interesting information regarding the California Rulemaking Process that I thought might be useful. This information relates to California but I expect that most states operate in a similar manner.

In 1979, the California Legislature created the Office of Administrative Law (OAL) to ensure that state agency regulations are authorized by statute, consistent with other law, and written in a comprehensible manner. Each year, state agencies propose thousand of regulations which, when adopted, affect almost all economic activities and every segment of the California public. OAL reviews each proposed regulation and approves a regulation only when the rulemaking agency has adequately considered public comments and if the regulation is easily understood, necessary, authorized, and consistent with law. When approved and filed with the Secretary of State, a regulation has the force of law.

Those who fail to comply with regulations can be cited, fined or suffer adverse consequences, such as losing a license or closure.

As you can see, this can be a very long and time consuming process. The flow chart below can help us better understand why we often wait so long for regulations to go into effect.

The California Rulemaking Process by which regulations are proposed, reviewed, and adopted or rejected:

1-State Agency
-Starts rulemaking file.
-Writes proposed regulations.
-Prepares Initial Statement of reasons which sets out factual basis for proposal.
-Issues public notice and 45 day, public comment period begins.

2-Public Notice
-Printed in Notice Register and sent to those on agency’s mailing list.

3-Public
-Must write to agency to be put on its mailing list to receive notice.
-Is encouraged to submit written comments to agency during this period (specific, factual statements are more effective). -Has right to see actual text of proposed regulation, Initial Statement of Reasons, material on which agency relied.
-Can challenge agency on meeting legal or procedural requirements, data used.
-Can propose less burdensome method of compliance.
4-State Agency
- Prepares Final Statement of reasons.
- Summarizes primary points of individual comments from public.
- Documents its decisions relative to points public raised.
- Adopts final regulations(s).
- Submits regulatory record including comments and responses to OAL for review and decision.

5-Office of Administrative Law
- Has 30 days to review entire contents of regulatory file.
- OAL’s review holds agencies accountable to the regulated public and deters unnecessary, unclear and overly burdensome regulations from becoming law.
- The same legal and procedural requirements applied to each regulation.
- Review is limited to file contents.

6-OAL Approval or Disapproval
- In most cases, if OAL approves regulations, it is filed with Secretary of State and becomes effective in 30 days.
- If OAL disapproves a regulation, it is returned to agency and does not become law.
- OAL issues a detailed disapproval decision that is printed in the California Regulatory Notice Register and in the California Code of Regulations Decisions.
- Agencies may appeal OAL’s disapproval to Governor.

For the status of California’s Continuing Education regulation as well as other issues that may affect you and your lab, check the AADMRT web site at www.aadmrt.com.

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Chemical Phenomenon

By: Gail Finnigan

This is an interesting chemical phenomenon. I had my regular weekly chemical service deliver fresh chemicals. I proceeded to clean both my processors and manually refill them with replenisher chemicals left for me. Please note: I have done this the same way for quite a while and never had a problem. When I tried developing duplication film it looked fogged or not completely fixed. X-ray film was developing normally. After a half an hour of trial and error, (thinking it was the film or the duplication light), every indication pointed to chemical incompatibility. The chemical serviceman thought it was due to old developer in my large processor replenishing tanks. It wasn’t, because the result was the same in my small processor, which had fresh replenisher bottles. If anyone has had this same experience, let me know if it was bad fixer or perhaps something else. Finally, I poured a small amount of chemicals from my small processors replenisher bottles into cups and developed a duplication exposed exactly the same, and they came out perfect. My only conclusion is that a different brand fixer was delivered that wasn’t compatible. Everyone seemed baffled by this, and I never got an answer that satisfied me.
Tomography of the Ionosphere
By: Marcelle Jones

The other day I took implant tomos on a very interesting patient. He told me about how he had used tomography in his work with the defense department. They were “mapping” the ionosphere. Satellites were used in space and tracking stations on the ground to get “slices” of the ionosphere at various locations. The analogy is the tracking stations were the beam and the satellites were the film. The purpose of this was to locate enemy naval ships—when the enemy sent radio signals through the ionosphere, we could track them and determine their location without detection. Because I hardly understand a word of what I just wrote, I was thankful I only took implant tomograms and wasn’t dealing with enemies, ionospheres, and much more complex issues than teeth!

This gentleman also told me about mapping the landmasses from the Antarctica where he spent one year—1969. At that time, they were beginning to use satellites to help with more accuracy in mapping. Apparently, they found the Easter islands were off by more than one mile and other geographical errors that had been accepted for years. He is now retired and lives in Colorado. He teaches skiing to handicapped adults. This guy made my day…what an inspiration!
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