



3D Radiography Breakthrough: Applications for Dental Professionals

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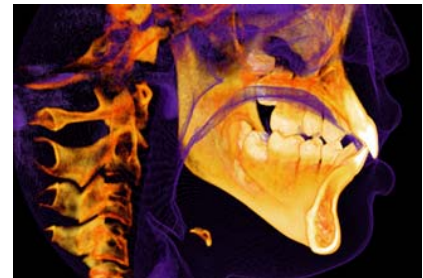
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Purpose

- Review evolution of radiography
- Describe latest advancement
 - Dental Cone Beam Computed Tomography
 - Aka: CBCT or 3D X-Rays
- Demonstrate innovations and clinical uses for 3D x-rays.
 - Oral surgery
 - Implants
 - Endodontics
 - Periodontics
 - Orthodontics



Wilhem Conrad Roentgen

- 1895 took first x-ray, over 100 yrs ago
- He was awarded the first Nobel Prize for physics in 1901.

Desire to Have 3D Perspective

Attempts to give 3D Perspective

Computed Tomography (CT)

- 1972: Godfrey Newbold Hounsfield invented the CT system.
- 1979: Nobel Prize in Medicine was awarded.
 - Initially, view was **only tomographic** (slice views) and **too large slice intervals** (1cm) for dentistry.

Dentistry's Trend for ~100 years

- Higher quality film images
- Lower x-ray dose
- More compact x-ray units
- Faster exposures
- Quicker film development
- Smaller & more comfortable film packets

Last 10 Years – Digital Imaging Same 2D Images, but..

- Higher quality images
- Lower x-ray dose
- More compact x-ray units
- Instant exposures & processing
- Smaller & comfortable sensors

Birth of Cone Beam CT

•**2000/2001**: NewTom installed at Loma Linda University. First in United States.

•**Presently #'s**: >200 CBCT units in US

–Number to double every year over next few years

–by 2010 50% of pano sales will be CBCT

3D Volumetric vs. 2D Imaging Dose

Panoramic	=	3 - 11 μ S
Lateral Ceph	=	5 - 7 μ S
PA Ceph	=	5 - 7 μ S
Occlusal	=	5 μ S
FMS	=	30 - 100 μ S
TMJ series	=	20 - 30 μ S
CBCT	=	40-135μS for average FOV

Fee

- Pan, Lateral Ceph, PA Ceph \$200-\$300
- TMJ Series \$250
- Additional films \$\$\$
- \$500 - \$800 for medical CT imaging
- CBCT Imaging Session ~\$400

Cost & Capabilities

- \$165K-285K (hardware & software) Software \geq \$7K
 - 0.2mm best slice thickness
 - 12 bit image best resolution
 - Interproximal caries detection has not been demonstrated
 - Metal (crowns, amalgam fillings, etc.) produces scatter artifacts & alters image quality
 - Traditional **intraoral sensors** are here to stay for the meantime
- ADI (Advanced Dental Imaging)

•First imaging center in Las Vegas established in 2004.

–**Dr. James Mah**, DDS, Msc, MRCD(C), DMSc

•Located in Summerlin

•<http://www.advanceddentalimaging.com>



3D Revolution Clinical Applications

Oral Surgery

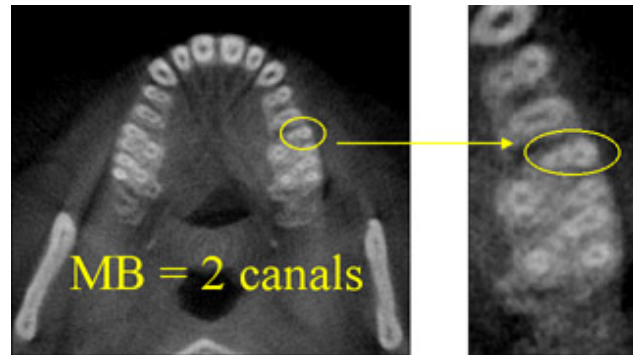
- Dx and Tx Planning of Impacted Teeth
- TMJ Reports & Anatomic Visualization
- Cysts, Neoplasms, or Fractures
- Airway Assessment
- 3D Surgical Models

Implantology

- Implant Surgery Adjuncts
- Implant Planning Software
- Image Guided Surgery

Endodontic Therapy

- Canal Assessment
- Root Fractures
- Apicoectomy Planning

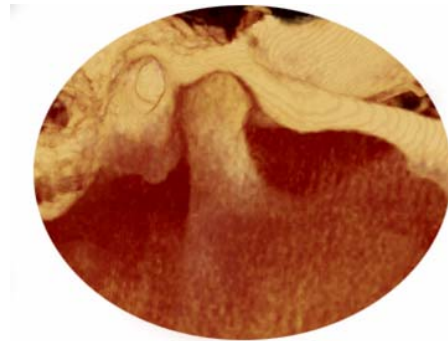


Periodontal Therapy

- Diagnosis & Treatment Planning of Osseous Defects

Orthodontics

- Complete Dx & Tx Planning
- Virtual patient
 - Soft tissue
 - Bone
 - Teeth
- 3D Modeling & Diagnostic Setups
- Mini-Screw Ortho Implants
- Indirect Bonding of Brackets
- Invisalign Aligner Fabrication



CBCT Advantages

- High resolution
- Specifically designed for dentistry
- Lower absorbed radiation dose
- Rapid imaging
- Lower cost
- Easier access – patient sits upright
- Viewing software designed for dentistry

Imagination is the limit!!!! Thank You!!!!