STRENGTHS OF COLLABORATION:
BRIDGING THE GAP WITH
CONE BEAM 3-D IMAGING

Presented by ADEA Section on
Oral and Maxillofacial Radiology
LEARNING OBJECTIVES:

- Summarize the significance of CBCT in dental curricula. (Parashar)

- Discuss the findings of a survey of U.S., U.K. & Australian dental schools to evaluate the inclusion of 3–D imaging in dental education. (Parashar)

- Assess the role of imaging in dental implant placement. (Mehranfar)

- Analyze the role of imaging in dental implant restoration. (Morton)
STRENGTHS OF COLLABORATION:
BRIDGING THE GAP WITH
CONE BEAM 3-D IMAGING

Presenter: Dr. Vijay Parashar
Chair, ADEA Oral Radiology section
Associate Professor, Midwestern University College of Dental Medicine - AZ
Ph. 623.806.7092
vparas@midwestern.edu
<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Imaging Sciences International</th>
<th>Imaging Sciences International</th>
<th>Dent-X / AFP Imaging</th>
<th>Dent-X / AFP Imaging</th>
<th>IMTEC / Kodak Dental Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Machine Name</strong></td>
<td>Next Generation i-CAT®</td>
<td>Classic i-CAT</td>
<td>NewTom 30047</td>
<td>NewTom VG</td>
<td>ILUMA Ultra CBCT</td>
</tr>
<tr>
<td><strong>Gray Scale</strong></td>
<td>14 BIT</td>
<td>14 bit</td>
<td>12 bit</td>
<td>14 bit</td>
<td>14 Bit</td>
</tr>
<tr>
<td><strong>Foot Print</strong></td>
<td>1.2m X 1.16m</td>
<td>H1.83 m x W1.12 m x D1.27 m</td>
<td>H 1.5m W 1.9m D 2.5m</td>
<td>H 2.28m W 1.14m D 1.49m</td>
<td>H 1.06 m x W1.42 m x D2.15 m</td>
</tr>
<tr>
<td><strong>Image Detector</strong></td>
<td>Amorphous Silicon Flat Panel</td>
<td>Amorphous Silicon Flat Panel, 20 cm x 25 cm</td>
<td>I.I. + CCD camera</td>
<td>Amorphous Silicon Flat Panel</td>
<td>Amorphous Silicon Flat Panel</td>
</tr>
<tr>
<td><strong>Rotation per scan</strong></td>
<td>Single</td>
<td>Single</td>
<td>Single 360° rotation</td>
<td>Single 360° rotation</td>
<td>Single 360° rotation</td>
</tr>
<tr>
<td><strong>Patient Positioning</strong></td>
<td>Seated</td>
<td>Seated</td>
<td>Supine</td>
<td>Sitting/ Standing/ Wheelchair</td>
<td>Seated</td>
</tr>
<tr>
<td><strong>Pre-Installed Software</strong></td>
<td>i-CATVision™; 3DVR</td>
<td>Xoran Cat, Vision and 3DVR</td>
<td>NNT</td>
<td>Dolphin Imaging &amp; NNT</td>
<td>ILUMA VISION3D</td>
</tr>
<tr>
<td><strong>Scan Time</strong></td>
<td>8.5 seconds (standard scan)</td>
<td>20 seconds standard</td>
<td>36 Sec</td>
<td>18 sec</td>
<td>20-40sec</td>
</tr>
<tr>
<td><strong>Scan Diameter</strong></td>
<td>8- 23cm diameter field of view</td>
<td>16 cm</td>
<td>20-15-10 cm</td>
<td>16cm</td>
<td>17-19cm</td>
</tr>
<tr>
<td><strong>Scan Height</strong></td>
<td>4-17cm height field of view</td>
<td>13 cm or 22cm</td>
<td>20 cm</td>
<td>14 cm</td>
<td>10-19 cm</td>
</tr>
<tr>
<td><strong>Slice Thickness</strong></td>
<td>0.125mm - 0.4mm</td>
<td>0.12-0.4 mm</td>
<td>0.1-0.5 mm</td>
<td>0.2-0.5mm (0.3 typ.)</td>
<td>0.09 mm</td>
</tr>
</tbody>
</table>
i-CAT Imaging Sciences
- 2683 – World over; 1367 – US

ProMax Planmeca
- 150 – US

NewTom AFP Imaging
- 5300 – World over
- 1800 – US
- 36 mobile CT units
Dental Applications

- Pre-surgical implant site evaluation
Dental Applications

- Pre-surgical implant site evaluation
Dental Applications

- Pre-surgical implant site evaluation
Dental Applications

- Pre-surgical implant site evaluation

![Image of dental implant site evaluation](image-url)
Dental Applications

- Pre-surgical implant site evaluation
Dental Applications

- Pre-surgical implant site evaluation
Dental Applications

- Pre-surgical implant site evaluation
Dental Applications

- Impactions/ Trauma / Craniofacial surgery evaluation
Dental Applications

- Impactions/ Trauma / Craniofacial surgery evaluation
Dental Applications

- Impactions/ Trauma / Craniofacial surgery evaluation
Dental Applications

- Impactions/ Trauma / Craniofacial surgery evaluation
Dental Applications

- Endodontic evaluation
Dental Applications

- Endodontic evaluation
Dental Applications

- Endodontic evaluation
Dental Applications

- Endodontic evaluation
Dental Applications

- Periodontal evaluation
Dental Applications

- Periodontal evaluation
Dental Applications

- TMJ visualization
Dental Applications

- TMJ visualization
Dental Applications

- TMJ visualization
Dental Applications

- Surgical guide fabrication
- Other CAD/CAM devices (3-D models)
Dental Applications

- Surgical guide fabrication
- Other CAD/CAM devices (3-D models)
Dental Applications

- Surgical guide fabrication
- Other CAD/CAM devices (3-D models)
Dental Applications

- Pre-surgical implant site evaluation
- Impactions/ Trauma / Craniofacial surgery evaluation
- Periodontal evaluation
- Endodontic evaluation
- TMJ visualization
- Surgical guide fabrication
- Other CAD/CAM devices (3-D models)
CBCT in dental curricula

- Traditional dental education has focused on teaching conventional 2D imaging.
- Survey-based study to evaluate the incorporation of CBCT teaching – both taking the scans and interpreting the images.
- In predoctoral (DDS/BDS) and postdoctoral/residency speciality training.
- Dental Schools in the USA, UK and Australia.
Objectives

- Determine inclusion of 3D image acquisition, interpretation and application of implant planning software in dental education.

- Evaluate any differences that may exist between pre-doctoral and post-doctoral education.

- Evaluate any differences that may exist between Dental Schools in the USA, UK and Australia.
Methods

- Between April and July 2010, a nine question survey form was electronically mailed to 57 Dental Schools in the United States, 15 Dental Schools in the United Kingdom and 7 Dental Schools in Australia.
Results

- Overall the response rate was excellent with
- 56 Schools responding in the USA (98% response rate)
- 15 Schools responding in the UK (100% response rate)
- 7 Schools responding in Australia (100% response rate)
Results

- Fifty dental schools (89%) in the USA have a cone beam tomography machine.
- Ten dental colleges in United Kingdom
- One dental school in Australia presently have a cone beam computed tomography machine.
Dental schools in the USA
Conclusions

- Dental schools recognize the importance of CBVT imaging and its applications in dentistry.
- Most of the dental schools have adopted 3D images in Predoctoral oral radiology courses.
- A higher number of post-doctoral dental residents are receiving training to acquire, interpret and apply software manipulation to CBVT images.
- A similar trend was noticed in American, British and Australian dental education.
“Still, let’s do an x-ray just to be sure.”
Acknowledgement

- Dr James R Geist
- Dr Jahanzeb Chaudhry
- Dr Eric Whaites
- Dr Paul Monsour
STRENGTHS OF COLLABORATION: BRIDGING THE GAP WITH CONE BEAM 3-D IMAGING

Presenter : Dr Joe Mehranfar
Adjunct Professor, Midwestern University
College of Dental Medicine – AZ
joemehranfar@pinnacleimplants.com
What’s the Standard of Care?
Digitization

Patient information
Traditional workflow

Placing implants

Restoring them later
Guide directs implants towards prosthetic needs

Implant placement should be performed according to prosthetic needs
Case #1 Jody
Case #2 Joann
Surgical Guide
Seating the Guide
Implant Placement
Implant Placement
Seating the Prosthesis
Case #3 Max
Accurately Accurate
OR
Accurately Inaccurate