CBCT

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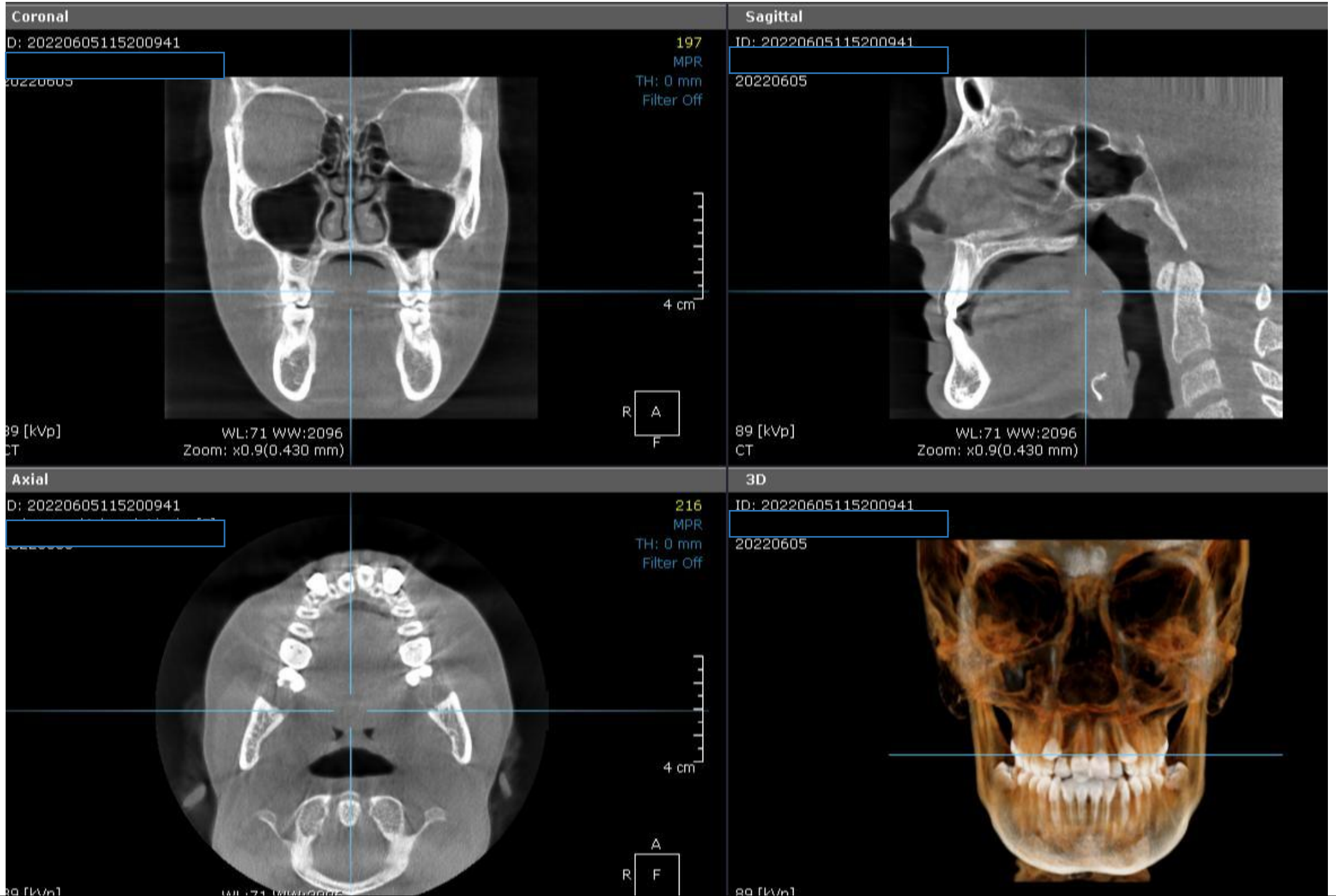
Cone beam technology was first introduced in the European market in 1996 and into the US market in 2001.

It is a special type of x-ray machine used in situations where regular dental or facial x-rays are not sufficient. It is not used routinely because the radiation exposure from this scanner is significantly more than regular dental x-rays. This type of CT scanner uses a special type of technology to generate three dimensional (3-D) images of dental structures, soft tissues, nerve paths and bone in the craniofacial region in a single scan. Images obtained with cone beam CT allow for more precise treatment planning.

With cone beam CT, an x-ray beam in the shape of a cone is moved around the patient (360°) to produce a large number of images, also called views. CT scans and cone beam CT both produce high-quality images.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CBCT, a new imaging modality introduce three-dimensional image beside to three multiplaners views, coronal, sagittal and axial in one rotation only with low dose and simpler technique than multi detector computed tomography(MDCT).

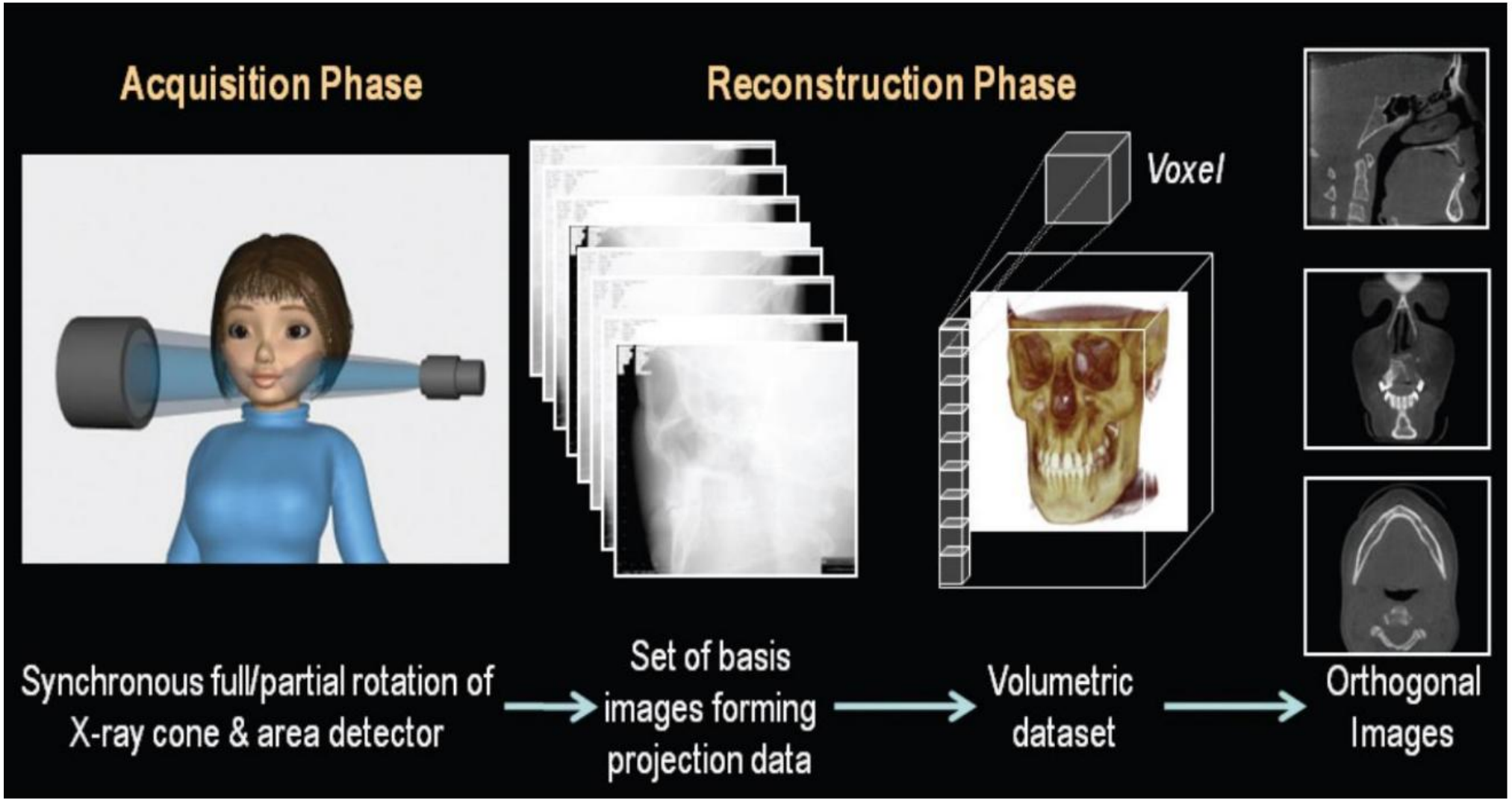
It is a proved that the accuracy of CBCT in diagnosis was compared or higher than multi-slice CT, because it has isotropic voxel with high resolution and small voxel less than 0.3 mm, and it could produce 160 to 360 slice with high resolution compared with MDCT.

With cone beam CT, an x-ray beam in the shape of a cone is moved around the patient to produce a large number of images, also called views.

CT scans and cone beam CT both produce high-quality images.

Preparation for CBCT imaging

A cone beam CT examination requires no special preparation. Prior to the examination, you may be asked to remove anything that may interfere with the imaging, including metal objects, such as jewelry, eyeglasses, hairpins and hearing aids



The Mechanics of CBCT Acquisition

Field of view (FOV) can be chosen by the size of the desired area for review, displaying a higher resolution than can be achieved when working in small spaces. The effective radiation dose is lower at a smaller FOV. Moreover, the regions, with the exception of the certain limited certain areas, do not receive radiation. The images are taken from the skull in 5–70 seconds, the length of time varies according to the product device and FOV size from 4 to 17 cm in height, from 15 to 18 cm in diameter, in a cylindrical volume area and with a selected cross-section range in the third plane.

Small S (50x50)

Small S+ (50x100)

Medium M (80x100)

Medium M+ (80x165)

Large L (140x100)

Large L+ (140x165)

XL (180x165) Optional

XL+ (240x165) Optional

Voxel size determines the clarity of images. Its name comes from two words: Voxel = Volume + Pixel. CBCT images have been made by voxels. The CBCT device determines the resolution of the image and creates a 3D set consisting of small cube-shaped structures known as voxels. When the voxel size decreases, the

number of cubes in per unit area increases, and thereby the resolution and clearness of the image increase. However, the radiation exposure time increases, and thus the radiation dose patients take increases. For dental applications, with 0.3 voxels in 8.9 seconds, 440 images can be obtained in three

plane with CBCT, and, with 0.125 voxels in 26.9 seconds, 624 images.

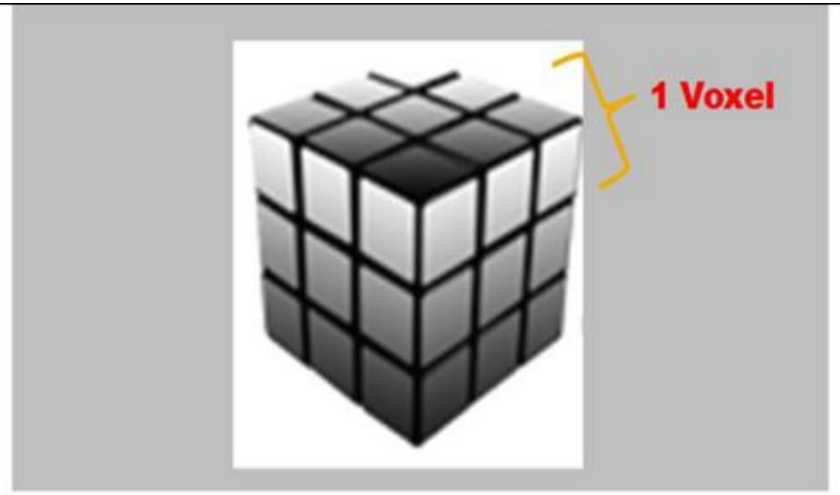


Figure 3. Voxel size determines the claritiy of images (Voxel = Volume + Pixel)

Dental cone beam CT is commonly used for

- treatment planning of orthodontic issues.
- surgical planning for impacted teeth
- diagnosing temporomandibular joint disorder (TMJ).
- accurate placement of dental implants.
- evaluation of the jaw, sinuses, nerve canals and nasal cavity.
- detecting, measuring and treating jaw tumors.
- determining bone structure and tooth orientation.
- locating the origin of pain or pathology.
- cephalometric analysis. reconstructive surgery.
- in endodontics to see broken instrument and to locate accessry or missed canals.

Advantages of CBCT

-The focused x-ray beam reduces scatter radiation, resulting in better image quality.

-A single scan produces a wide variety of views and angles that can be manipulated to provide a more complete evaluation.

-Cone beam CBCT scans provide more information that conventional dental x-ray, allowing for more precise treatment planning.

-CBCT scanning is painless, noninvasive and accurate.

-No radiation remains in a patient's body after a CBCT examination.

-The obtained images are shown in their real size; growth (magnification) and distortion do not occur.

Disadvantages of CBCT

1-CBCT devices are expensive.

2-Dentists should undergo a period of additional theoretical and practical training on CBCT to examine the image data on the computer.

3-A fast computer is required to examine the images.

4-More time is required to examine the images.

5-The radiation dose is higher than in conventional dental radiography. However, the benefit of an accurate diagnosis far outweighs the risk.

6-The extreme rise and fall in the temperatures of the area surrounding the device can damage the quality of the images.

7-Because children are more sensitive to radiation, they should have a 3D CBCT exam only if it is essential for making a diagnosis and should not have repeated CBCT exams.

Limitations of CBCT

Although it is less radiation dose than computed tomography, but it still higher than

conventional x-ray

- Metallic objects, such as fillings may produce marked streak on the image


Thank
YOU