

Al-Mustaqbal University Colleg
Medical Physics Department



Medical Imaging

Lecture 5

Computed Tomography (CT Scan)

Second Stage

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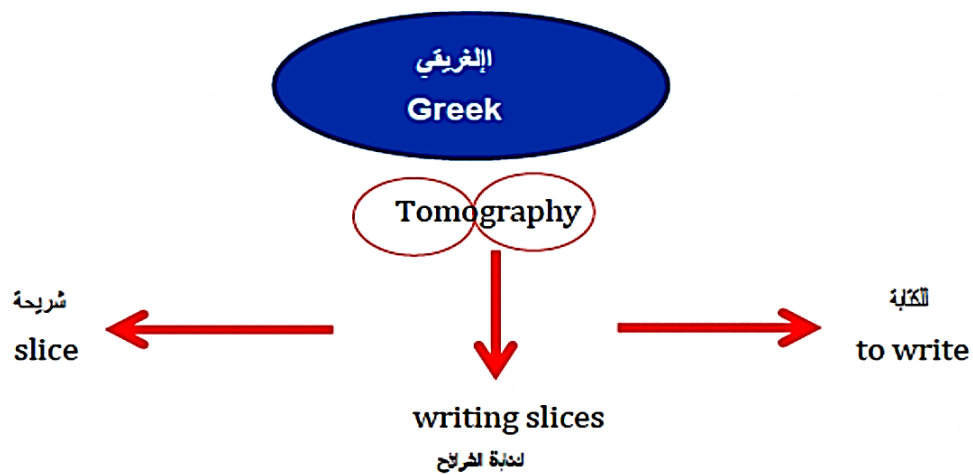
Definition of Computed Tomography (CT Scan)

- ✓ It is a medical imaging system that creates 3D cross-sectional images of the internal body used for diagnostic.
- ✓ Using complex x-ray
- ✓ It is representing the virtual pile of 3D cross-sectional images.



History of Computed Tomography (CT Scan)

The word '**tomography**' comes from the Greek: **tomos** means slice, **graphic** stands for 'to write'. So, tomography literally means '**writing slices**'.

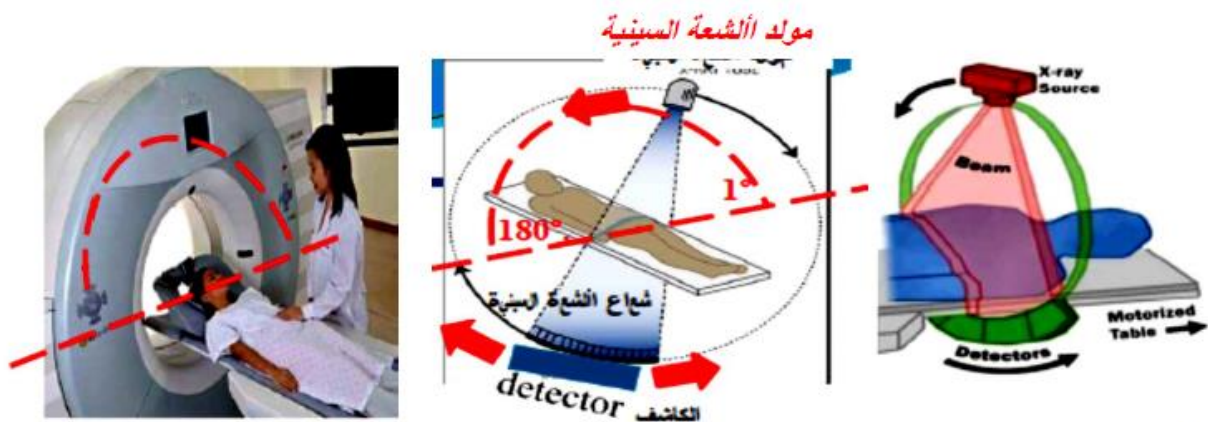
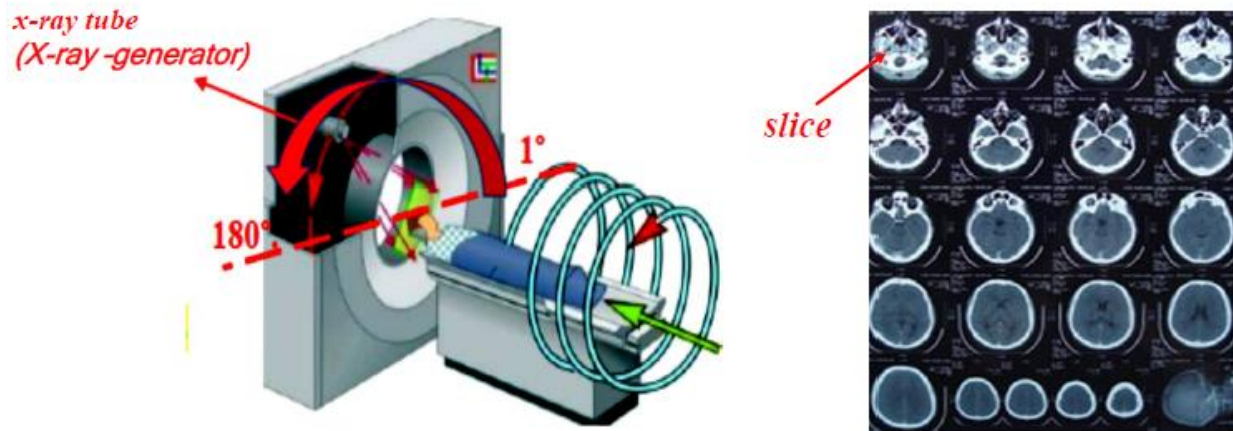


Description of Computed Tomography (CT Scan)

- (1) CT scan is medical images system of the body using complex x-ray.
- (2) CT scan creates 3D cross-sectional.
- (3) CT scan can be performed on every part of the body for a different of reasons.
- (4) CT scan is a scan for many points and angles.
- (5) Each scan represents a one of the x-ray dropping on the patient.
- (6) Each scan represents one of the slice.

Equipment for computed tomography

- CT scanners are available as single slice scanner, helical scanner and multi-slice scanner.
- In general, all the scanners possess a
 - (i) control console,
 - (ii) computer,
 - (iii) gantry
 - (iv) couch.
- Recent developments have brought slip ring technology and multi-detector
- The Z-axis is the gantry rotation axis, longitudinal, and run along foot to head of the patient.
- The Y axis is perpendicular to the patient in the direction ground to ceiling.
- The X-axis runs side-side of the patient.



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How a CT scan system works ?

- ❖ The x-ray tube and detector rotate as a fan-shaped on a semi-circular.
- ❖ The x-ray tube and detector rotate at the same time in opposite directions within a semi-circular, to collect the multitude of x-ray projections (dropping).
- ❖ The x-ray generator is rotated within 1° to 180° .
- ❖ The patient is placed between the source and detector.
- ❖ Each scan represents a one of the x-ray dropping on the patient



Transversal CT slice of the, chest

Typical AP (anterior- posterior or front-
to- back) chest X- ray photograph.

Why used CT scan instead the plain radiograph/X-ray ?

- ❖ CT scans provide more detailed information to diagnose.
- ❖ For example, in case there is a small lung cancer at a front-to-back chest.
- ❖ By using the plain radiograph/X-ray cannot determine the location of this cancer because the cancer might disappear behind a ribs.
- ❖ So, this case need to a cross-sectional medical images (CT scan).

Benefits/Risks

Benefits of a CT scan:

CT scans provide more detailed information to diagnose, compared with plain radiograph/X-ray

فوائد التصوير المقطعي المحوسب

توفر الأشعة المقطعية معلومات أكثر تفصيلاً للتشخيص ، مقارنةً بالتصوير الشعاعي العادي / الأشعة السينية

Risks of a CT scan:

The risks of a CT scan is long exposure to x-rays which make it more dangerous,

compared with plain radiograph / X-ray

مخاطر الفحص بالأشعة المقطعية

مخاطر الأشعة المقطعية هي التعرض الطويل للأشعة السينية مما يجعلها أكثر خطورة ،

مقارنة مع التصوير الشعاعي العادي / الأشعة السينية