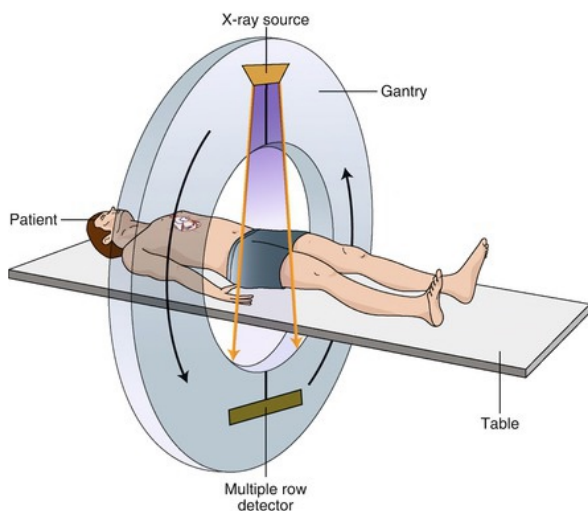


CT Basics

- Computed tomography involves passage of a collimated X-ray beam through the patient to obtain images of thin transverse sections of head & body.
- A sensitive detection system with photomultiplier tube is employed, with X-ray tube rotating around the patient during each cycle.



X-Ray beam produced → Passes through patient body



↓
Creates Radiographic image

↓
Detected & Captured by Detectors

- Absorption values are expressed on a scale of +1000 units for bones, the max. absorption of X-Ray beam, to -1000 units for air, the least absorbent.
- Each image represents a section through the body, the thickness being varied from 1 to 10 mm.
- Tissues lying above or below this slice are not imaged & a series of slices is taken to cover a particular region.

Uses of CT :

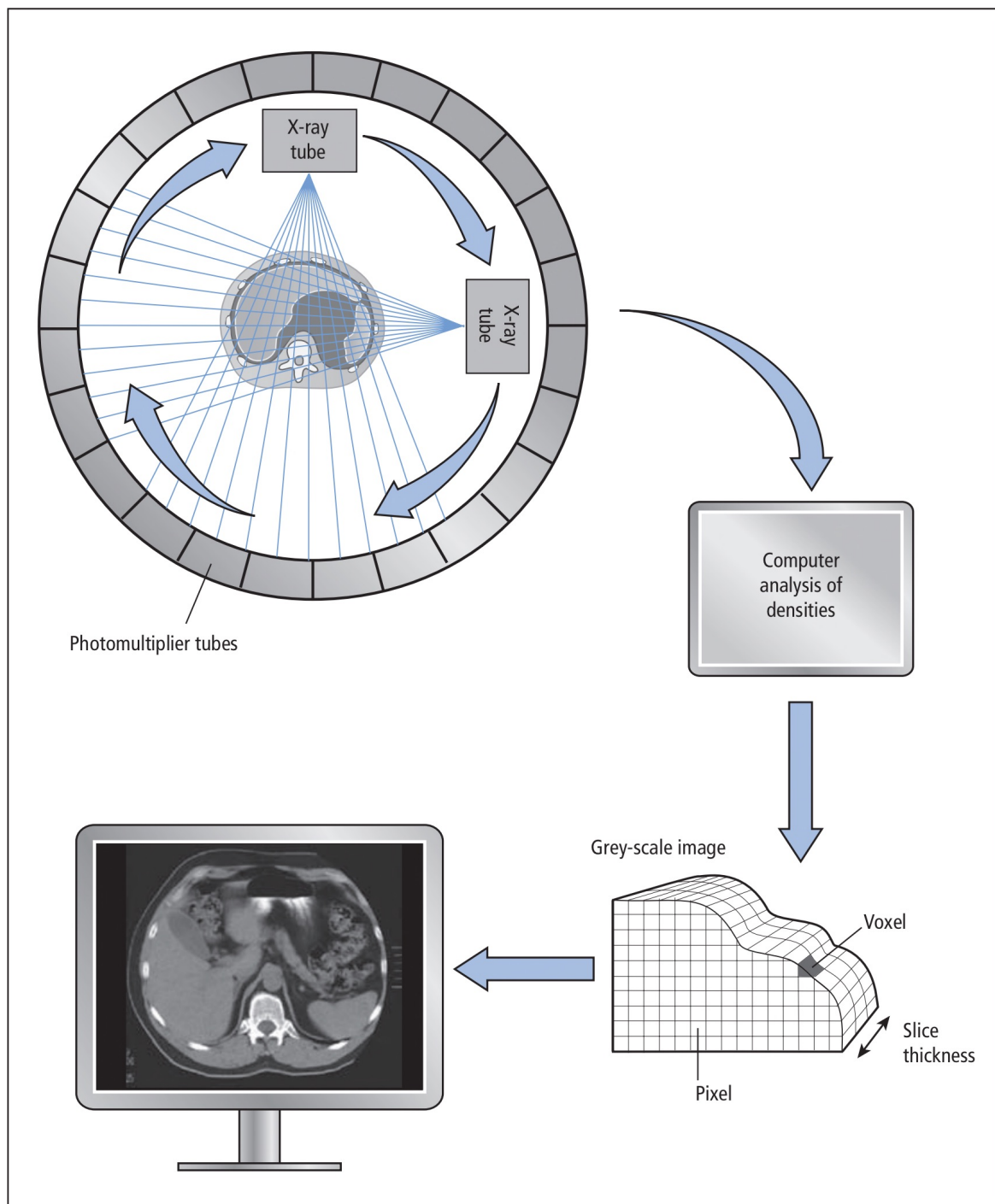
- (i) Any region of body can be scanned - Brain, Neck, Limb, Abdomen.
- (ii) Staging primary tumors
- (iii) Radiotherapy planning
- (iv) Exact anatomical detail when ultrasound is not successful.
- (v) Vascular Anatomy.

Advantages :

- (i) Good contrast resolution.
- (ii) Precise anatomical detail
- (iii) Rapid examination technique
- (iv) Good diagnostic images are obtained in obese patients.

Disadvantages :

- (i) High ionizing radiation
- (ii) High cost of equipment & scan
- (iii) Bone artefacts in brain scanning, esp. the posterior fossa, degrade images.
- (iv) Scanning mostly restricted in transverse plane, although reconstructed images can be obtained in other planes.

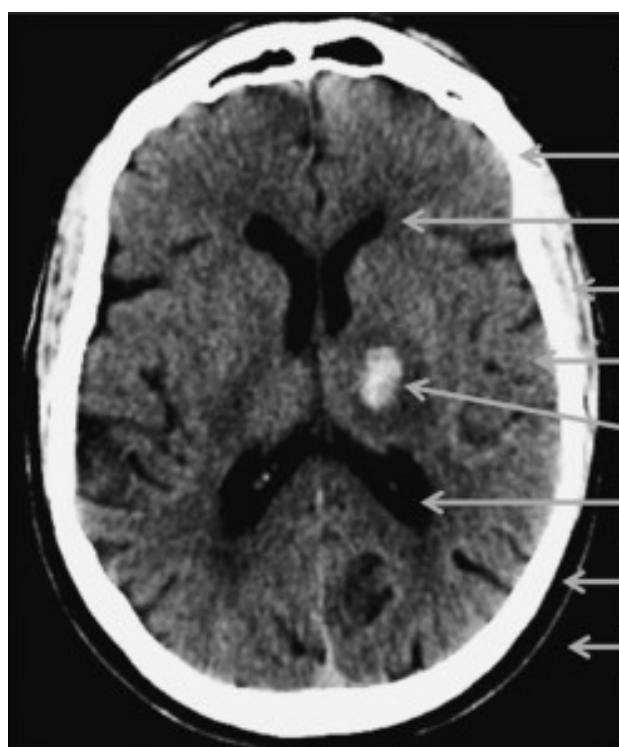
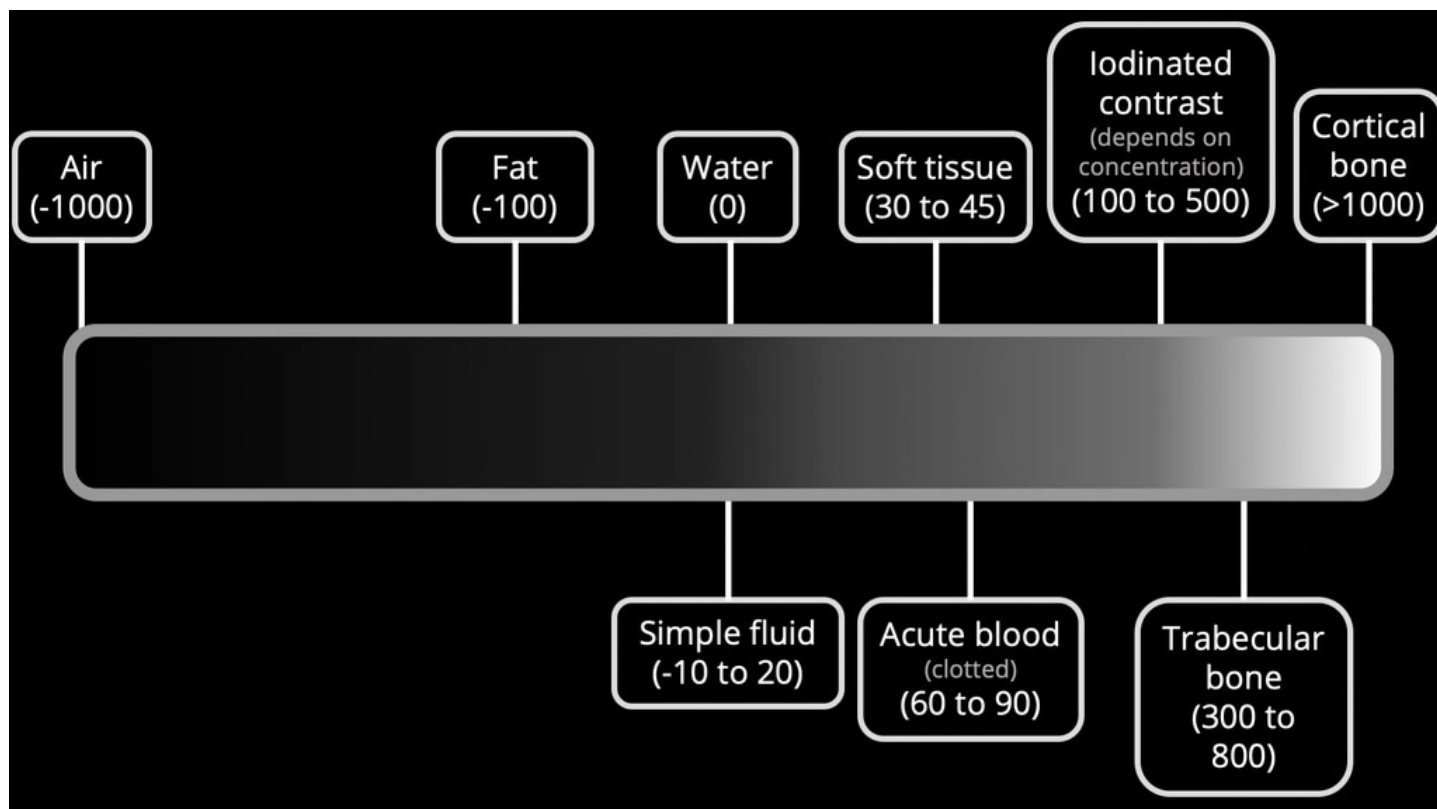


Hounsfield Unit or CT Value:

- Every tissue is given a numerical value in CT scan : Hounsfield unit value.

$$HU_{\text{material}} = 1000 \times \frac{\mu_{\text{material}} - \mu_{\text{water}}}{\mu_{\text{water}}}$$

(μ = linear attenuation coefficient)



CT Number Ranges in Hounsfield Units (HU)	
Bone	+1000
White matter	+20 to 30
Muscle	+20 to 40
Gray matter	+30 to 40
Hemorrhage	+65 to +95
CSF (water)	0
Fat	-30 to -70
Air	-1000



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