

Computed (axial) tomography scanning (CT scanning) creates images based on small differences in X-ray absorption allowing differentiation between different tissues. The digital nature allows for 'windowing' which spreads the available shades of grey (usually 256 or 1024) over a specified range of radiodensities and can bring out fine detail/differences not seen if the whole range of densities were divided equally amongst the available grey hues. The windowing is based on Hounsfield units (measure of radiodensity or attenuation of Xrays).

Substance	Hounsfield Unit
Air	-1000
Fat	-120
Water	0
Muscle	+40
Contrast	+130
Bone	+400 or more

Types of CT scanning

There are essentially two types of CT scans:

1. Conventional CT scan - the scan is taken slice by slice. (1 - 10mm)
2. Spiral/helical CT scan - this is a continuous scan which is taken in a spiral fashion. It is a much quicker process and the scanned images are contiguous.

Most CT scans are taken in axial plane, but coronal or sagittal etc are possible. Newer CT scanners can reconstruct a single plane data into other plane images or even 3D images.

Advantages of CT scanning

- Better detail compared with ultrasonography
- Relatively quick compared to MRI
- Most systems can be scanned e.g. brain to leg

Disadvantages of CT scanning

- Requires breath holding which some patients can not manage
- Artefact is common e.g. metal clips
- CT scans of the brain can be affected by bone nearby
- High doses of radiation are involved in CT scanning - see Radiation article

CT scanning with contrast

Contrast enhancement can improve delineation of lesions. Air, PO, and/or IV contrast are used.

Side effects of intravenous contrast

- Histamine release/anaphylaxis with bronchospasm, laryngeal oedema and ↓BP. Risk↑ if asthmatic, has urticaria, IHD, prev. reaction. Non-ionic/non-iodinated contrast better.
- Iodinated contrast may also precipitate hyperthyroidism (even storm).
- Osmotic load.
- Nephrotoxicity - in patients with pre-existing renal impairment, dehydration, DM, age>75, CCF, cirrhosis, HT, on NSAIDs. Definitely avoid if Cr>250. **NAC** 600mg before & 3 doses after contrast may prevent.
- Myocardial depression
- Prolong coagulation
- Contrast can be extravasated which can be severe enough to require skin grafting.
- Warmth/pain in injecting limb, odd taste in mouth, N&V, fits