

computerized tomography (CT) is a noninvasive medical examination that combines a series of X-ray images taken from different angles and uses computer processing to create cross-sectional images. many pictures of the same area are taken from many angles and then placed together to produce a 3D image. very small differences in x-ray absorption values can be visualized. This allows accurate display of cross-sectional anatomy, differentiation of organs and pathology, and sensitivity to the presence of specific materials such as fat or calcium. CT scan images provide more detailed information than plain X-rays do .

In CT scanning , the patient is passed through a rotating gantry that has an x ray tube on one side & a set of detector on the other. The usual thickness of section is between 1-10mm. By moving the patient through the gantry , multiple adjacent sections can be imaged ,Information from the detectors is analyzed by computer & displayed as a grey scale image. A much greater array of densities can be displayed than on conventional x ray films. White & light grey objects are said to be high attenuation, dark grey & black object low attenuation

By altering the grey scale setting , the image information can be manipulated to display the various tissue of the body e.g chest ct.

The relative density of an area of interest may be measured electronically . The attenuation value expressed in Hounsfield Unit. In CT , water is 0HF ,Substances less dense than water (fat, air) has negative value, substances of greater densities has positive value.

Advantage of ct scan over the x ray

On standard X-ray image it appears as if they are looking through the body.CT produce cross-section.CT is better to evaluate soft tissues such as the brain, liver, and abdominal organs, as well as to visualize subtle abnormalities that may not be apparent on regular X-ray tests.

Indication of use of ct scan

- Diagnose muscle and bone disorders, such as bone tumors and fractures
- Pinpoint the location of a tumor, infection or blood clot
- Guide procedures such as surgery, biopsy and radiation therapy

Detect and monitor diseases and conditions such as cancer, heart disease, lung nodules

Detect internal injuries and internal bleeding and liver masses

- Monitor the effectiveness of certain treatments, such as cancer treatment

Contrast material in CT

I.V.contrast

- 1.differentiation of normal bl. Vessels from abnormal masses e.g hilar vessels from L.N.
- 2.to make an abnormality more apparent e.g. liver masses.
- 3.to demonstrate the vascular nature of a mass
4. CT angiography.

Oral contrast material is also used for abdomen CT: • Differentiation of normal enhancing bowel loops from abnormal masses or fluid collections • Diagnosis of perforation of the gastrointestinal tract • Diagnosis of leaking surgical anastomoses • CT enterography .

For detailed examination of the pelvis and distal large bowel, administration of rectal contrast material is occasionally used.

Advantage of CT

- 1.CT scanning is painless, noninvasive and accurate.
2. CT examinations are fast and simple; in emergency cases.
3. Can examine any part of the body, particularly excellent for lung & mediastinum, bone pathology & for hemorrhage & calcification .
4. Useful for examination of the bowel
5. CT is less sensitive to patient movement than MRI.
6. CT can be performed if you have an implanted medical device of any kind, unlike MRI.

7. It is a good tool for guiding [minimally invasive](#) procedures such as [needle biopsies](#) and [aspirations](#).

Spiral computed tomography is a [computed tomography](#) technology involving movement in a helical pattern for the purpose of increasing resolution. These CT scanners have a gantry that rotates continuously in the same direction. During scanning, data acquisition is combined with continuous movement of the patient through the gantry.

Multidetector row CT (MDCT), also known as multislice CT (MSCT), was developed in the 1990s. MDCT builds on the concepts of helical CT. The difference with MDCT is that instead of a single row of detectors multiple detector rows are used. The original MDCT scanners used two or four rows of detectors, followed by 16 and 64 detector row scanners. , 256 and 320 row scanners are becoming widely available.

The major advantages of MDCT over conventional CT scanning are: • Increased speed of examination • Rapid examination at optimal levels of intravenous contrast concentration • Continuous volumetric nature of data allows accurate high-quality 3D and multiplanar reconstruction.

MDCT therefore provides many varied applications including: • CT angiography • Cardiac CT, including CT coronary angiography and coronary artery calcium scoring • CT colography (virtual colonoscopy) • Planning of fracture repair in complex areas: acetabulum, foot and ankle

Limitation &disadvantage of ct:

1. Use of ionizing radiation
2. Frequently need contrast study & hazards of I.V contrast material
3. High cost
4. Availability & lack of probability of the equipment.
5. limited to axial section
6. certain areas such as dense bones poorly visualized by CT e.g. post. Fossa & spinal cord
7. Artefact is caused by high-density metal in teeth and joint replacements.
8. contra indicated in pregnant female.