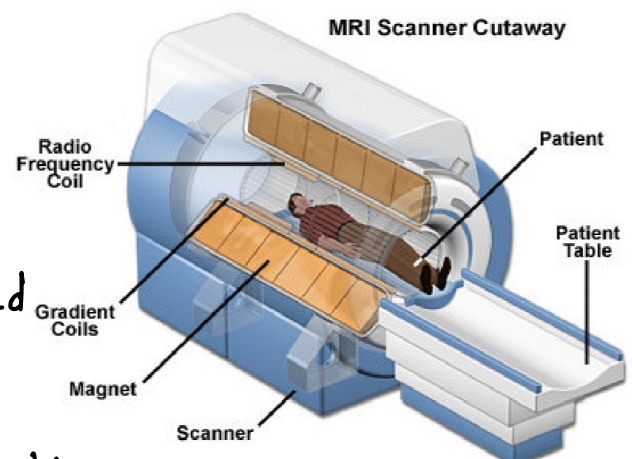


MRI Basics

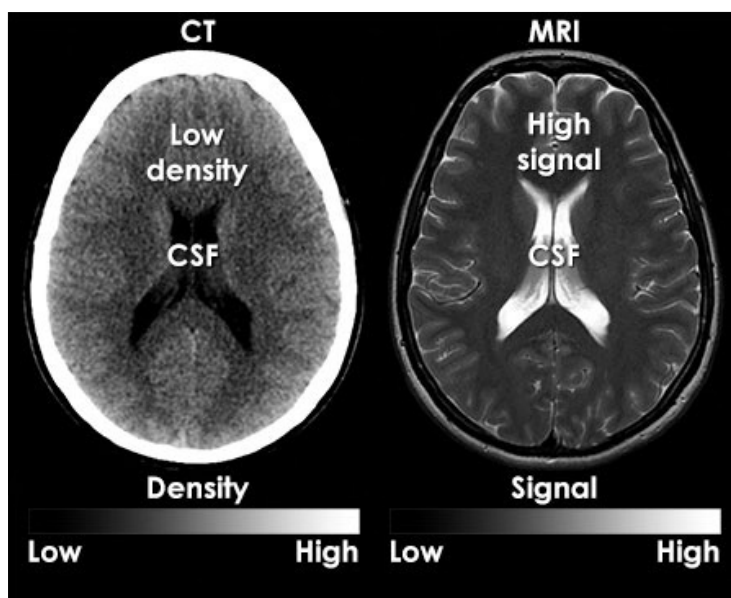
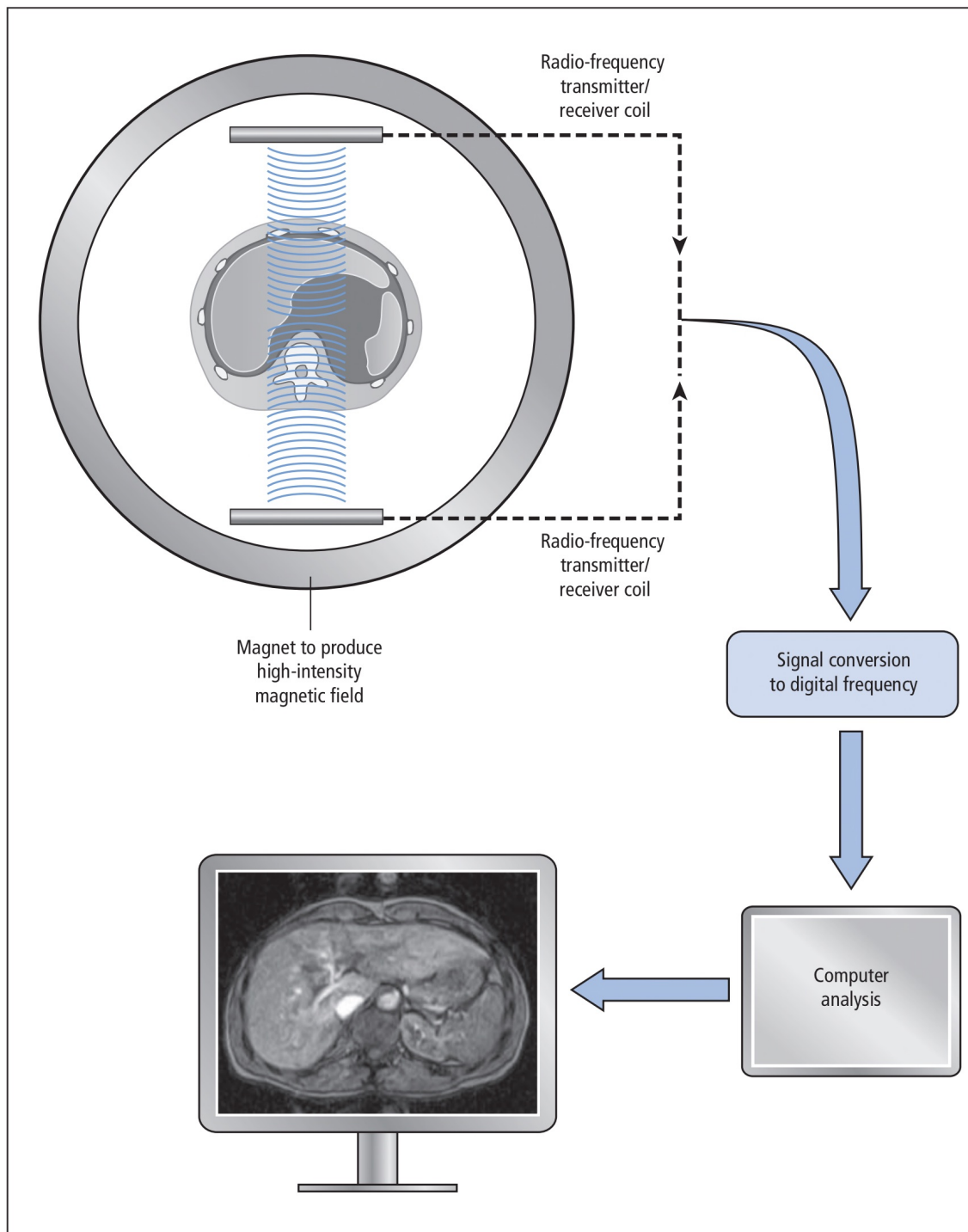
- Magnetic resonance scanning produces images of the body by utilizing the magnetic properties of certain nuclei, principally those of Hydrogen in water molecules.



- Based on the gyromagnetic property of Hydrogen nucleus.
- The patient is placed in the scanner tunnel & subjected to a high intensity magnetic field.
- This forces the hydrogen atom nuclei to align with magnetic field.
- A pulse of Radio frequency applied to these nuclei then displaces them from their position ; when the pulse ceases, they return to their original state, releasing energy (in form of Radio-frequency signal).
- Computer analysis processes this energy into digital signal with conversion to a grey scale image.



- * The basic principle of MRI is a study of response of magnetized tissue to a pulse of Radio-frequency, whereby pathological tissue returns different signals compared to Normal.



CT v MRI - brain

- ◆ CT is a map of tissue density – white areas represent higher density tissues than blacker areas
- ◆ MRI is a map of proton energy in tissues of the body – white areas represent high 'signal'
- ◆ Cerebrospinal fluid (CSF) is low density on CT
- ◆ On this MRI image the CSF is white – indicating high signal

Uses :

- (i) CNS : Technique of Choice for brain & spinal imaging
- (ii) Musculoskeletal : Accurate imaging of Joints , tendons, Ligaments & muscular abnormalities.
- (iii) Cardiac : Imaging with gating techniques related to the cardiac cycle enables the diagnosis of many cardiac conditions.
- (iv) Thorax : Assessment of Vascular structures in mediastinum.
- (v) Abdomen : Well visualized , surrounded by high signal from surrounding fat.
- (vi) Pelvis : Staging of Prostate , bladder & Pelvic Neoplasms

Indications & Contraindications :

Indications

Trauma	Osteoporosis or compression fracture
Unexplained weight loss, insidious onset	Prolonged use of corticosteroids
Unexplained fever, history of urinary or other infection	Focal neurologic deficit(s) with progressive or disabling symptoms, cauda equina syndrome
Immuno-suppression, diabetes mellitus	LBP duration longer than 6 weeks*
History of cancer	Prior surgery
	HIV
	Sphincter or gait disturbance

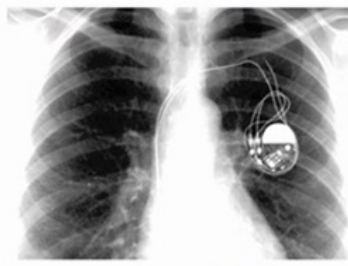
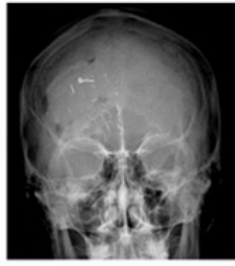
Contraindications

Ferromagnetic cardiac pacemakers and defibrillators
Ferromagnetic intracranial aneurysm clips
Implanted pump
Certain otic implants
Ferromagnetic foreign bodies in critical locations, e.g., the eye
Stents-coils-filters

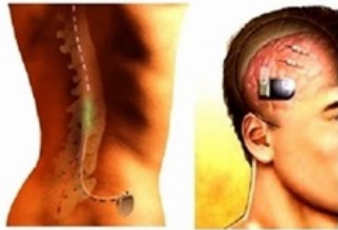
Most common contraindications for MRI scan



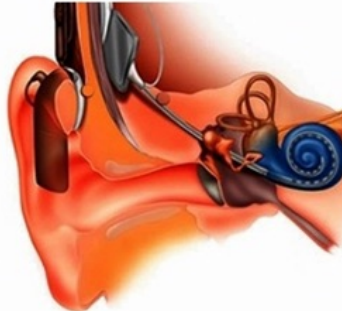
Aneurysm clips



Heart pacemakers



Neurostimulators



Cochlear implants



Bullet injury in vital organs

Advantages

- Can image in any plane – axial, sagittal or coronal.
- Non-ionizing and hence believed to be safe to use.
- No bony artefacts due to lack of signal from bone.
- Excellent anatomical detail, especially of soft tissues.
- Visualizes blood vessels without contrast: magnetic resonance angiography (MRA).
- Intravenous contrast utilized much less frequently than CT.

Disadvantages

- High operating costs.
- Poor images of lung fields.
- Inability to show calcification with accuracy.
- Fresh blood in recent haemorrhage not as well visualized as by CT.
- MRI more difficult to tolerate with examination times longer than CT.
- Contraindicated in patients with pacemakers, metallic foreign bodies in the eye and arterial aneurysmal clips (may be forced out of position by the strong magnetic field).



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