



## Magnetic Resonance Imaging (MRI)

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### INTRODUCTION :

Magnetic resonance imaging (MRI) is a medical imaging technique that uses a magnetic field and computer-generated radio waves to create detailed images of the organs and tissues in your body. Most MRI machines are large, tube-shaped magnets. When you lie inside an MRI machine, the magnetic field temporarily realigns water molecules in your body. Radio waves cause these aligned atoms to produce faint signals, which are used to create cross-sectional MRI images — like slices in a loaf of bread. The MRI machine can also produce 3D images that can be viewed from different angles.

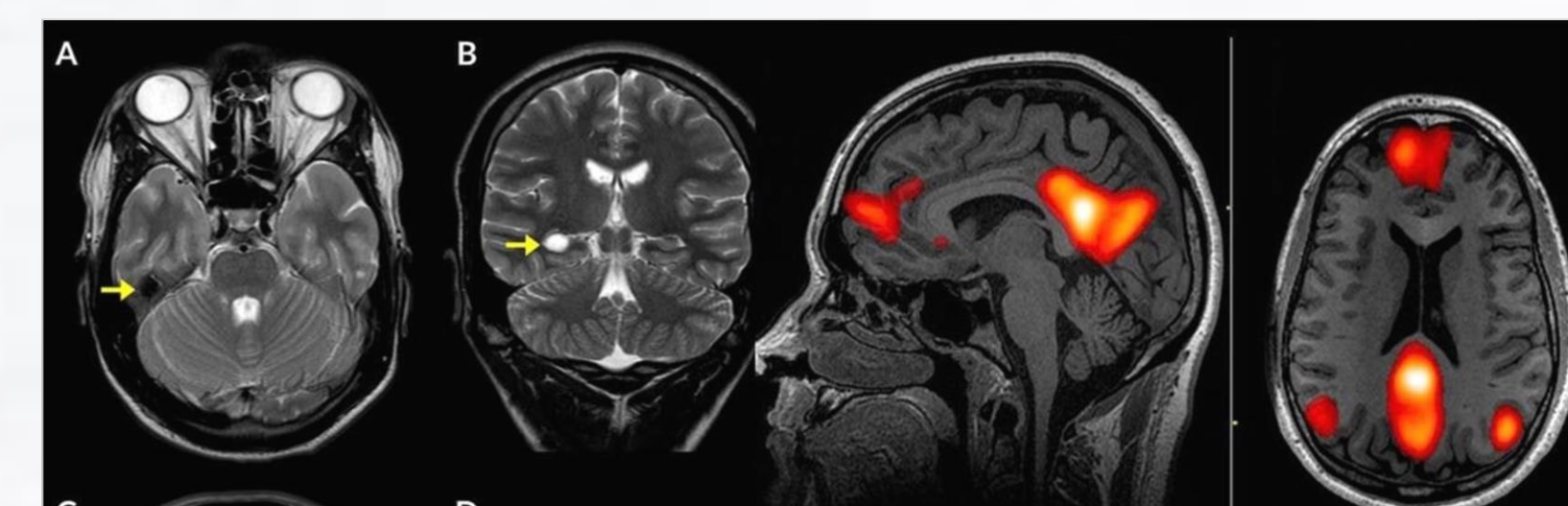


### MRI Operation :

The nuclei of atoms show magnetic properties, so they can orient themselves in a magnetic field by acting as small magnets; allowing scientists to monitor these particles and see even the smallest details, and how they behave. The nuclei resonate at specific frequency when a broad spectrum of radiofrequency waves is applied this is known as resonance. Each voxel is the number of nuclei that resonate at each specific frequency -this is known as signal intensity- so the more nuclei resonate, the higher the intensity. The value of each frequency or tone gives information about the circumference of the atom.



MRI ROOM



### MRI Components :

- 1- Strong Magnet
- 2- Source of radio waves
- 3- Radio wave reader, generator, and booster
- 4- Variable magnetic field controller
- 5- PC
- 6- Control unit
- 7- Digital converter
- 8- Radio pulse programmer
- 9- Power Supply
- 11- Film
- 12- Insulator
- 13- Patient table

### MRI Applications :

- 1- Diagnosis of stroke
- 2- Fractures and brain tumors
- 3- Spinal injuries Soft tissue injuries
- 4- Imaging of the veins and arteries
- 5- Neuroimaging of the brain
- 6- Liver and bile duct imaging
- 7- Imaging of spinal deformities

