

*AL-Mustaqbal University College  
Department of Medical Physics  
The Second Stage  
Medical Imaging*

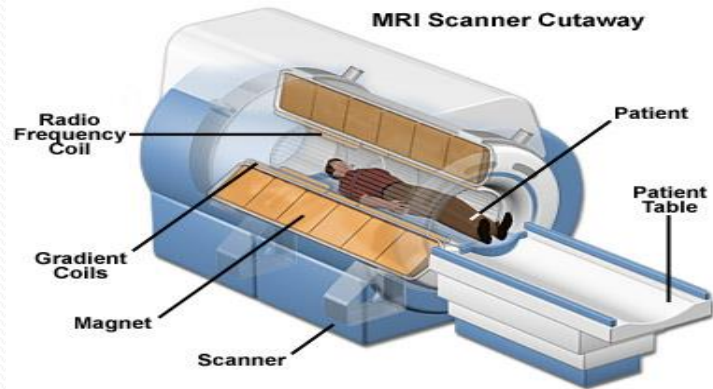


كلية المستقبل الجامعة  
قسم الفيزياء الطبية  
المرحلة الثانية  
التصوير الطبي



## Magnetic Resonance Imaging (MRI)

التصوير بالرنين المغناطيسي



**What is a MRI ?**

**How does MRI work?**

**What the patient does before using MRI?**

**Factors affecting MRI image quality**

**What are the benefits & risks?**

# Magnetic Resonance Imaging (MRI)

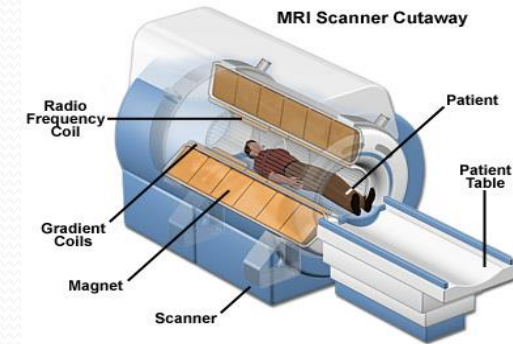


## What is a MRI ?

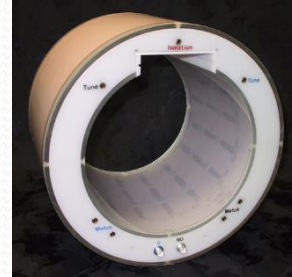
- 1) MRI is a medical imaging system for obtaining 3D cross sections images of the inside of human body
- 2) MRI does not use x-ray radiation
- 3) MRI is used magnetic fields and radio waves
- 4) It takes a lot of a slice from a sections of body (cross sections) similar to a CT scanner
- 5) The MRI unit has a tunnel and a flatbed which will slowly move into the centre of the tunnel

## How does MRI work?

- MRI uses **magnetic fields** and **radio waves** in its work
  - Radio wave pulses act to re-arrange (re-align) the **protons** in the atoms of the elements in the body
  - The most stimulating of these elements is hydrogen
  - After stopping radio waves, the **protons** of atoms in the body return to their usual ( normal) alignment. This case leads to emission of energy depending on the type of body tissue.
  - Magnetic field is generated by passing an electric current through wire coils. This magnetic field captures the emission energy and creates a picture of the tissues scanned based on this information and then generates a series of images



Wire coils in MRI units



### What the patient does before using MRI scanner?

ماذا يفعل المريض قبل استخدام جهاز  
التصوير بالرنين المغناطيسي؟

- i) may be asked to remove any metal objects
- ii) may be given a robe to wear during the procedure
- iii) may be asked to show relaxation if you don't like closed in spaces.
- iv) may be asked to discontinue (stopping) the use of resonance in case implantation medical devices

## Factors affecting MRI image quality

العوامل المؤثرة على جودة الصورة التصوير بالرنين المغناطيسي

- 1- To get high-quality images, the patient should be able to remain constant (does not move) , and follow breath-holding instructions
- 2- A patient who is very large may not fit (suitable) into the opening tunnel of MRI unit.
- 3- The presence of a metallic object sometimes makes it difficult to obtain clear images.
- 4- A very irregular heartbeat may affect the quality of images obtained.
- 5- Advised not to have an MRI exam during the first three months of pregnancy.

### Benefits & Risks of MRI

فوائد ومخاطر التصوير بالرنين المغناطيسي

- i) In MRI don't use ionizing radiation, so there is no risk to the average patient
- ii) MRI used instead of CT scan for diagnosing problems of the soft-tissue such as the heart or liver.
- iv) MRI enables the discovery of defects that may be hidden by bone with better than other imaging methods
- v) Magnetic field is not dangerous , but the implanted medical devices that contain metal may cause problems during an MRI exam