**TAQ 4**

**1. Describe and explain how an MRI scanner produces images. Discuss the effectiveness, benefits and limitations of using MRI compared to other imaging methods.**

Ans.

MRI stands for Magnetic Resonance Imaging. It is also known as nuclear magnetic resonance imaging. It is a technique used for creating very detailed images of patients body.

The human body contains billions of Hydrogen(H) atoms. All these atoms have their independent strong magnetic moments. Also, all these H atoms are spinning in random directions. Because of their magnetic moments, the H atoms line-up in the direction of magnetic field when placed inside one. When a patient undergoes MRI scan, a slice of body is imaged at a time. When the magnetic field is applied, half the H atoms allign towards the head and other half allign themselves towards the feet of the patient. The two halves almost cancel out each other but a very tiny fraction of H atoms still remain unmatched. Then the MRI machine applies a Radio Frequency(RF) pulse to the slice under observation. This RF pulse is specific to H. The RF pulse forces the unmatched tiny fraction of H atoms to spin differently from others and in a particular direction. When the RF pulse is stopped the spinning H atoms return to their natural alignment and release the energy they absorbed from RF. This released energy is picked up by the sensors and then sent to the computer to generate a detailed image.

The MRI is very effective when imaging is needed to be done for soft tissues, body organs, ligaments etc. It is used for detecting multitude of disorders like strokes, eye problems, ear problems etc. It has an added benefit of being able to take image of the slice under observation in any plane desired without the necessity of moving the patient. An MRI scan has the capability of creating images in any of axial, sagitall, coronal and amy plane in between without moving the patient. The MRI also generates one of the best quality images, which helps the analyser . It is also considered relatively safe for patients since it does not use any kind of radiation for creating the images. Eben though there is no evidence to show that MRI scan is dangerous for foetus, it is generally not recommended for pregnant women.

One major limitation of MRI scan is that the patient is required to stay in fixed position for longer durations. It may become very uncomfortable for most. The equipment used for MRI scan is very costly, as a result, the MRI scans are costly too. Because of the high magnetic power involved in the process, MRI scan can become very dangerous if proper care is not taken while removing magnetic objects from the patients body. Also, the RF pulse used can be absorbed by the tissue causing it to heat up and cause serious dis-comfort to the patient under observation.

Reference List

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