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Advantages of Using MRI in Making Diagnosis Compared to Other Modalities

Magnetic Resonance Imaging (MRI) is a form of noninvasive test employed by physicians in health care facilities to diagnose as well as treat various medical conditions (Anderson 523). The MRI system employs powerful magnetic fields, pulses from radio frequencies as well as a computer to offer detailed photographs of organs, bones, soft tissues as well as all other internal body structures. The MRI scanners uses the field gradients from very strong magnetic fields as well as radio waves in generating the images of various internal parts of the body. This essay offers a discussion of the advantages of using MRI services in making diagnosis compared to other modalities such as computed tomography, ultrasound and nuclear medicine.

**MRI in Clinical Practice**

It can be employed to aid in diagnosing as well as monitoring the treatment of various health conditions affecting the chest, pelvis as well as the abdominal section. Nevertheless, expectant women cannot have an MRI because it may pose a significant level of danger to the unborn child. In the head, MRI scanners can take pictures of brain tumors, nerve injuries, aneurism and bleeding of the brain. It can also be used to check for any damage to the head, which might have been caused by a stroke.

In the chest region, MRI scanning can be employed to check for any issues that could be affecting the heart, coronary blood vessels as well as the blood vessel valves. It is also capable of illustrating whether the heart or lungs in a person’s body have been damaged. The use of MRI scanners to check any issues with the blood vessels as well as check the flow of blood inside the vessels is referred to as Magnetic Resonance Angiography (MRA).



**Figure 1:** Image showing an MRI machine at work.

MRI can detect problems within the blood veins and arteries, such as blocked blood vessels, torn lining of blood vessels as well as aneurism (Bhattacharyya, Siddhartha and Hrishikesh 188). MRI can also be employed to check for problems of various organs in the belly. This is in organs such as the kidneys, gall bladder, liver, pancreas and urinary bladder. Also, MRI can check for any problems with joints and bones such as arthritis, bone tumors, bone marrow problems, bone infections, torn ligaments and tendons, as well as issues with the temporal mandibular joints. Ultimately, MRI can be employed to check for any problems with the discs and nerves situated on the spine for any conditions that might affect them such as disc bulges, spinal stenosis, as well as spinal tumors.

**Advantages of Using MRI Over Computed Tomography**

Computed Tomography (CT) is a form of imaging procedure that works through the use of special x-ray equipment in creating detailed photographs as well scans of various parts inside a person’s body. It is also referred to a Computerized Tomography as well as Computerized Axial Tomography (CAT). Unlike the CT scans that employ x-rays, MRI scans only use powerful magnetic fields as well as radio frequency pulses in developing detailed photographs of soft tissues, organs, bones as well as other internal body structures. Also, unlike the CT scanning, MRI is capable of clearly illustrating the difference between the normal as well as abnormal tissues in a person’s body. MRI is also advantageous over CT scan in that it does not expose a person’s body to any form of radiation.

In addition, the MRI methodology is best suited for a cross examination of soft body tissues situated in ligaments. It can also be employed for checking any injuries on the soft tissues resulting from tendon injuries, brain tumors as well as spinal cord injuries. Such are examinations that cannot be executed through the use of a CT scan, since the CT scan is only best suited in checking various bone injuries, cancer development as well as development of chest and lung problems.

Another primary advantage of an MRI is that it does not expose a person’s body to other conditions such as cancer, which might be brought by repeated exposure to radiation. The MRI machines are also capable of producing images of a person’s body in any plane. This is because they are capable of performing a 3D isotropic imaging that allows an MRI specialist to check a person’s body on three dimensions (Acton 49). The 3D isotropic imaging also facilitates multi-planer Reformation (Acton 64). On the other hand, a CT scan is not capable of performing 3D imaging without changing the patient’s position.



**Figure 2:** Image showing a CT scanning equipment.

Another great advantage of employing MRI in the healthcare practice over CT scan is its ability to change the contrasts of various images detected in a person’s body. This is because small changes in radio waves as well as magnetic fields are capable of creating a complete change in the contrast of the image. Also, different contrast settings through the MRI scans can highlight the different forms of body tissues in a person’s body. Ultimately, MRI scans are extremely accurate in disease detection on any part of a person’s body in comparison to the CT scanning. In most cases, MRI is employed after the CT scan test have failed to yield sufficient information that could be employed for confirming a patient’s diagnosis.

**Advantages of Using MRI over Ultrasound**

Ultrasound is a form of imaging that employs high frequency sound waves in checking at a person’s body organs and structures inside the body. In most cases, healthcare professionals employ ultrasound to view a person’s liver, heart, blood vessels, kidneys as well as other organs. In most cases, an ultrasound in used to check the position of a fetus during pregnancy. Unlike x-rays, ultrasound is safe because it does not expose a person to any form of radiation. During an ultrasound test, a person is asked to lie on an operation table.

A special technician or the doctor moves a device known as a transducer over the part of the body being investigated. The transducer emits sound waves to the affected region, which then bounces off back from the various tissues within the affected body parts. The transducer is connected to an ultrasound machine that develops images of the sound waves (Gibbs, Cole & Sassano 29). Despite the effectiveness of the ultrasound in checking various parts of the body, MRI is more superior to ultrasound testing based on the effectiveness of its usage. This is because unlike ultrasound, MRI is capable of creating a three dimensional view of all the affected parts of the body.



**Figure 3:** Images of an ultrasound scanning machine.

This is a contrast to the ultrasound system, which only creates a real-time moving image of the body region being examined. The most common use of ultrasound is to check the status of a fetus inside a pregnant woman’s uterus. However, ultrasound scanning is ineffective in areas where there is air or bones inside the body. This is because the sound waves are easily altered by the existence of air cavities within the body. For this reason, it is not capable of examining body organs such as the lungs since the air inside them immensely interferes with the transducer’s sound waves. Nevertheless, this is not a problem that can be encountered when using the MRI system for organs or tissue imaging.

**Advantages of using MRI over Nuclear Medicine**

Nuclear medicine is a branch in the health care sector that deals with medical imaging through the use of small amounts of radioactive substances. This is so as to diagnose as well as determine the severity of underlying medical conditions. Nuclear medicine is employed in the treatment of cancers, gastrointestinal conditions, endocrine conditions, heart diseases, neurological disorders as well as other abnormalities within a person’s body. Nuclear medicine employs the endo-radiology methodology, which is a record of all radiation that is emitting within a person’s body. This is instead of basing its findings on the radiation generated by external sources such as the X-rays.

In its usage, nuclear medicine differs from radiology in that the nuclear medicine scans’ emphasis is not primarily on the imaging autonomy but on the functioning and severity of conditions on the affected regions. This is also referred to as physiological imaging modality. The primary advantage of using MRI over nuclear medicines is that MRI is safer on patients as it does not expose them to any minimal health risks in comparison to nuclear medicine. On the hand, the associated risks of using nuclear medicine is that it exposes patients to radiations that might eventually cause cancer. Patients who have been exposed too much to nuclear medicine treatment can attain various health issues and complications, with the highest risks affecting the elderly, young and expectant patients.

In some cases, the use of nuclear medicine can make underlying conditions to become worse. This is one of the fundamental reasons why the MRI scans among other treatments are recommended over nuclear medicine in medical imaging. MRI is also advantageous over nuclear medicine in that the costs of offering nuclear medicine is far more costly than the cost of having MRI scanning. For this reason, nuclear medicine is quite expensive to the majority of patients, especially those without insurance covers, as compared to the cost of having an MRI scan. On the other hand, in nuclear medicine, the cost of purchasing, maintaining, installing as well as operating some of the equipment used in its administration can be extremely expensive.

**Conclusion**

In conclusion, the MRI is a form of noninvasive test that is normally employed by physicians in health care facilities so as to diagnose as well as treat various medical conditions. The MRI system employs powerful magnetic fields, pulses from radio frequencies as well as a computer to offer detailed photographs of organs, bones, soft tissues as well as all other internal body structures. In comparison to other forms of imaging such as the computed tomography, ultrasound, and nuclear medicine, MRI poses superior advantages. This is because it does not expose patients to harmful x-rays and radiation that could, later on, affect the health of patients. MRI also supports 3D isotropic imaging and it is considered to be the most precise method of checking any issues affecting soft body tissues, blood vessels as well as bones in the body.

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