



Expert Eye Ltd

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SAFETY GUIDANCE FOR MRI REFERRALS

Guidelines issued by the Medical Devices Agency with regard to the use of Magnetic Resonance Imaging (MRI) recommend that all referrers:

- Are registered medical practitioners or registered health professionals
- Are conversant with exposures and safety implications relating to MRI
- Must confirm that there is no contraindication to MRI for their patient before referral
- Inform the accepting clinician or responsible radiologist of the patient's state of health and medical history.

Patients should be exposed to MRI only with the approval of a registered medical practitioner (clinician or radiologist), with whom ultimate responsibility for the patient's well being will rest, and who must be satisfied that the exposure is likely to contribute to the treatment of the patient.

To conform to the above recommendations Expert Eye has produced this user-friendly document for referrers, which highlights the key areas relating to MRI safety.

1. MRI Safety

There are various issues relating to the magnetic field that may prevent a patient undergoing an MRI scan.

- MRI can not be performed on patients who have Cardiac Pacemakers**
- MRI can not be performed on patients who have Cranial Aneurysm Clips**
- MRI can not be performed on patients who have Cochlear Implants**
- MRI can not be performed on a patient who has a metallic foreign body in the orbit**
- MRI can not be performed on patients who have neuro-stimulator or certain biometallic implants**
- MRI should not be performed (unless in an emergency) on a woman during the first trimester of her pregnancy.**

High Risk Issues – require assessment prior to scanning

- **Vascular clips other than in the brain**
- **Shrapnel**
- **Metallic implants**
- **Shunts**
- **Venous filters**
- **Haemostatic clips**
- **Heart Valves (most are safe but certain older makes are contraindicated)**
- **Pregnancy**

2. MRI Exposure Limits

There are three types of magnetic field exposures related to MRI. Static magnetic fields, time varying magnetic fields and radio-frequency magnetic fields. All commercial scanners are designed to function within acceptable exposure limits and there are currently no known long-term side effects to MRI scanning. The only area where exposure limits are of concern is during pregnancy (discussed later). The referrer (with the exception of possible pregnancy) therefore does not have to be concerned about MRI exposure limits.

The Missile Effect

When entering the MRI scan room there is a significant magnetic field which has the potential to accelerate any metallic item at high speed into the centre of the magnet; there have been cases of wheelchairs and similar objects flying into the centre of the scanner. Metallic objects



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in the body may also be affected by the *missile effect*; this can cause metallic items within the body to move. Metallic objects will only move inside the body if they are not fixed or fibrosed to solid tissue. Examples where the missile effect may be extremely dangerous are intracranial aneurysm clips that may be weakly attached to the wall of an artery, and the presence of metallic foreign bodies in the eye which can move in the magnetic field. The referrer **must** question the patient regarding any surgery that may have involved metallic implants and as to whether the patient has ever had a history of metallic foreign body in the eye.

Metallic objects such as hip replacement, orthopaedic screws and shrapnel embedded in solid tissue does not move during an MRI examination and therefore is safe in most cases to scan with precaution (see *Heating Effect*).

Magnetisation Effect

Metallic items taken into the scan room may become magnetised and cease to function. Examples of this are cardiac pacemakers, cochlear implants and other devices such as neuro stimulators. The referrer **must** ensure that the patient they refer for MRI has no internal metallic devices that may be affected by magnetic fields, this includes items containing any electronic, magnetic, metallic valves or switches.

Heating Effect

The MRI examination causes heating in the area of scanning. This is normally not an issue for patients' safety as normal blood circulation diffuses this slight local heating. The exception to this is during pregnancy where the heat absorption effect to the foetus is unknown and therefore referrers should always clarify with a medical practitioner if an MRI examination is required during pregnancy. The guidelines recommend that MRI scans are not carried out except in emergencies during the first trimester of pregnancy.

A more intense heating effect may occur in any conductor of electric current such as a wire. Many implanted devices such as neuro stimulators and cardiac pacemakers have electrically conducting wire elements and these can cause severe burns. Referrers should always establish the presence of any implanted bio-mechanical devices which would be excluded from MRI scanning.

Large metallic implanted items may also be affected by heating (such as a metal hip replacement). In practice we find this not to be a significant issue and should a patient with this type of metallic implant feel discomfort during a scan then the scan will be terminated.

Other Considerations

The MRI environment is potentially claustrophobic. However modern MRI scanners are considerably more compact than their predecessors and most claustrophobic patients manage to have a successful and uneventful MRI scan. There are only a very small number of severely claustrophobic patients who cannot be scanned. In our experience, it is better not to alert the patient to the potential claustrophobic effect as this causes unnecessary worry in advance of the scan. All scanners have emergency buzzers that patients can activate during the scan should they need to gain the attention of the radiographers to remove them from the scanner.

The MRI scan can also be quite noisy if fast scanning procedures are carried out. However all patients are given ear protection as a matter of course by the scanner personnel.



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3. Referrer's Responsibility

It is the responsibility of the referrer to assess the patient for any condition or implanted device that may be adversely affected by the MRI scan. Many devices are implanted into patients these days and it is often difficult to assess whether these implants will be affected by the magnetic fields. Should the referrer be unsure as to the safety of any devices they should contact Expert Eye customer helpline prior to referral. Expert Eye customer helpline may need to consult with a radiologist or occasionally the manufacturer of certain devices in order to establish the safety of the implant.

The radiographers will always require the patient to complete a Safety Questionnaire prior to the MRI examination. This is a secondary screening safety net but does not negate the need for the referrer to do primary screening.

There follows a list of absolute contraindications to MRI and high-risk issues.

Absolute Contraindications

- Cardiac pacemaker
- Cochlear implant
- Aneurysm clip in the brain
- Metallic foreign body in the orbit of the eye
- Certain bio metallic implants and neuro-stimulators

High Risk Issues – require assessment prior to scanning

- Aneurysm clips other than in brain
- Shrapnel
- Metallic Implants
- Shunts
- Venous filter
- Haemostatic clips
- Heart Valves (most are safe but certain older makes are contraindicated)

All referrals must be authorised by a Consultant Radiologist. Patients should be referred using the referral form with a supplementary letter if further information is required. The referral will then be checked by a Consultant Radiologist to confirm that MRI is the appropriate investigation. Once this has been authorised the appointment will be made promptly.

Name:

Registration number:

Address:

Qualifications:

I have read and acknowledge the MRI contra indications detailed above.

Signed:

Date:

Signed on behalf of Expert Eye:

Date: