MAGNETIC RESONANCE – BASIC SAFETY FACT SHEET

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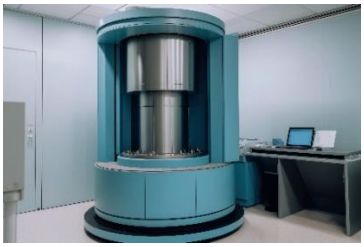
Scope: This fact sheet provides guidance on the safe use of magnetic resonance (MR) technology. The information in this fact sheet is designed to assist you to conduct and then document your risk assessment within UQ Safe.

Introduction:

MR technology, encompassing nuclear magnetic resonance (NMR) and magnetic resonance imaging (MRI), is widely used in both research and medical settings. However, MR systems generate strong magnetic fields that pose unique safety challenges.



Nuclear magnetic resonance (NMR)

Magnetic resonance imaging (MRI)

Hazard Summary

Magnetic field hazards

Projectile Risk: Ferromagnetic objects can become dangerous projectiles in the presence of strong magnetic fields. Examples include fire extinguishers, tools, keys, jewellery, magnetic stirring bars, watches, scissors, badges, and flashlights. These items must be kept outside a pre-determined safety radius to prevent injury and equipment damage.

Implant Risk: Metallic implants, even those that are not ferromagnetic, can shift or heat up in a magnetic field, potentially leading to injury. Examples include pins, shrapnel, insulin pumps, aneurysm clips, cochlear implants, and prosthetic limbs.

Impact on Medical Devices: Individuals with pacemakers or other magnetically sensitive implants must avoid areas where the magnetic field exceeds 5 gauss, as these devices can malfunction, potentially causing injury. Medical devices such as defibrillators, hearing aids, and glucose monitors must be kept outside a pre-determined safety radius.

Field Strength Markings: Areas where the magnetic field exceeds 100 gauss should be clearly marked. No workstations or public access points should fall within the 5 gauss line to ensure safety.

Securing Objects: All gas cylinders and magnetic tools must be secured, particularly within the 100 gauss line. Magnetic objects, in general, should be kept outside this boundary.

Magnetic Storage Media: Items such as credit cards can be damaged by strong magnetic fields and should be kept beyond the 10 gauss line.

Other hazards

Quench Events: During a quench (rapid helium release), a large vapor cloud may form. The room must be large enough and have adequate ventilation to manage this. If not, helium vent pipes or oxygen monitor-connected exhaust fans should be installed to safely dissipate the vapor.

Magnetic Systems Fire: A fire in magnetic systems can cause the magnet to rupture dangerously. In a quench event, the extreme cold gases may cause air to condense on surfaces, likely forming liquid oxygen, which poses a fire hazard.

High Energy Power Supplies: Caution is necessary around high-energy power supplies to prevent accidental contact. Power cords and cables should be kept off the floor to reduce tripping hazards, and evacuation routes must be clearly visible. Unescorted visitors should never be allowed in high magnetic field areas.

Electrical Transformers: Electrical transformers can become magnetically saturated above 50 gauss.

Flooding: Flooding in the magnet room could result in electrocution risks.

Signage & Units

Signage: Proper signage indicating the hazards should be posted at all entrances to the magnet room, restricting access to authorized personnel only.

Magnetic Fields Units: Magnetic Fields are measured in tesla (T), millitesla (mT), gauss (G), or milligauss (mG).

1T = 1,000 mT

1G = 1,000 mG

1T = 10,000G

1mT = 10,000mG

Peer Reviewed References

These references have been reviewed by staff of the HSWD and are recommended to assist you further with your risk management:

- RANZCR MRI Safety Guidelines, The Royal Australian and New Zealand College of Radiologists
- Non-ionising Radiation Protection in Australia, Australian Radiation Protection and Nuclear Safety Agency

Contact details

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