



# MRI Safety

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# “MISSILE EFFECT”

- Objects containing iron, nickel, and cobalt are considered ferromagnetic and will be pulled towards the scanner.
- This would include steel toe boots, scissors, IV poles, crash cart, etc....
- Ferromagnetic items are NOT SAFE around the MRI Scanner and should never enter Zone 3 nor Zone 4.
- Metals cannot be classified as magnetic by sight alone. Any items that are not labelled as MR Safe should be considered MR UNSAFE.



# MEASURING MAGNETIC FIELDS

- High magnetic fields are measured in TESLA.
- Low magnetic fields are measured in GAUSS.
- 1 Tesla = 10,000 Gauss
- For perspective, an industrial magnet (used to lift cars) are about 1 Tesla.
  - **Most MRI Scanners are 1.5 or 3.0 Tesla.**
- Active magnetic shielding is located within the MRI Scanner, itself. While this shielding reduces the distance the magnetic field strays from the scanner, it does not eliminate nor reduce its strength.



# MRI ZONES

- Zone 1 = Any area accessible to the general public: Parking lot, etc....
- Zone 2 = Interface between general public and the highly restricted Zones 3-4.
  - Area for storage of unsafe objects/devices
  - Area for gowning/dressing room
- Zone 3 = MR Control Room
- Zone 4 – Scanner Room
  - Most restricted area!
- The walls surrounding Zone 4 (Scanner Room) contain materials that prevent radio signals from outside from interfering with the MRI Scan. This is known as RF SHIELDING.



# EMERGENCY SITUATIONS

- The magnetic field can be removed quickly by releasing the cryogenes from inside the scanner. This procedure is known as a “QUENCH” and should only be used in life or death situations.
  - Cryogenes should be automatically vented through a pipe in the ceiling, but occasionally these systems can fail and cause cryogenes to be released into the scan room, itself!
    - Cryogenes can cause asphyxiation, cold burns “frostbite”
    - Cryogen leaks can occur regardless of whether the MRI scanner is “ON”
- The magnetic field can be slowly removed or “ramped down” by an engineer through directing the stored electricity that is inside the scanner into another electrical storage device/battery.
- In the event of a FIRE, the first priority is to EVACUATE THE ROOM!
  - This is true of all emergencies that occur in the scan room to prevent untrained personnel, first responders, etc... from bringing metallic objects into the strong magnetic field (axes, tools, crash cart).



# MRI ZONE 3 AND ZONE 4 NO-NO'S!!!

- Electronic items such as cell phones, credit cards and ID badges can be easily damaged by the magnet.
- Many medical devices are not safe to undergo MRI. Some examples include:
  - Neurotransmitters
  - Aneurysm clips
  - Insulin pumps
- Metals cannot be classified as magnetic by sight alone. Any items that are not labelled as MR Safe should be considered MR UNSAFE.





Stretcher brought into room by nurse **without** MRI Tech present.



Ventilator



# Pulse Oximeter Burn Related to MRI: MR Unsafe

➤ Pulse Oximeter Burn



➤ Post Escharotomy



➤ Day 5



➤ Post Amputation



Child who was burned by the pulse oximeter which was **not removed** prior to the scan.

