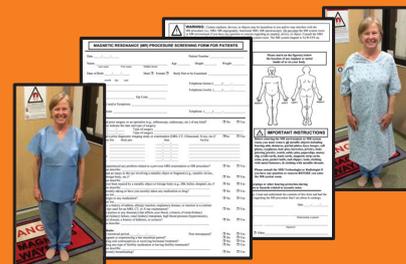




Keeping Safe in MRI

Screening for MRI

Comprehensive Screening Form
Thorough Patient Interview & Evaluation
No Street Clothes or Shoes on Patients



Magnetic Field (B_0)

Make No Assumptions → Ask Questions
Assess Metal → No Projectiles & No Torque
“MR Safe” or “MR Conditional” → Identify & Comply



Acoustic Protection & Monitoring

Hearing Protection → Always
Squeeze Bulb Provided → Always
Constant Visual & Audio Monitoring → Always



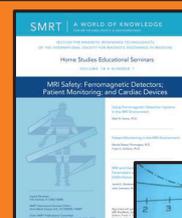
RF Field (B_1)

No Loops in Cables or Anatomy
Assess Metal → No Heating & No Burns
Separate & Insulate Anatomy, Bore Walls & Cables



Trained & Educated

MRI Safety Training for MRI Staff & MDs
Annual Training for Nursing & Ancillary Staff
Policies set by Departmental MRI Safety Committee





SMRT MRI Safety Active Implanted Biomedical Devices

Does your patient have an implanted device that is electronic, programmable, or provides active therapy?

Need to obtain the following information:

- Manufacturer name
- Model name and/or number
- Serial number



Does the active implanted device have MRI safety information?

- 'MR Conditional'
- 'MR Unsafe'
- Not tested or labeled for MRI
- FDA warning



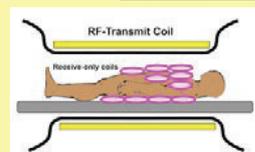
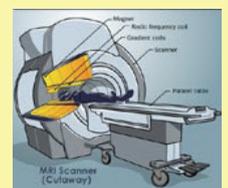
Risk versus Benefit decision is conducted by the MR Physician

- Does the device require special programming or monitoring?
- Any scanning limitations?
- Are there exclusion zones?
- Do you have the personnel and necessary equipment to meet the 'MR conditional' labeling requirements of the device?



Device labeling 'MR conditions' necessary to fulfill can include:

- Field strength (B_0)
- Maximum spatial gradient level (B_0)
- RF coil (transmit-receive coil or whole body transmit coil)
- SAR and/or $B1+rms$ levels
- Time varying gradient magnetic fields (dB/dt or slew rate)
- Length of each MRI acquisition/scan



Is your MRI suite equipped and ready to handle adverse events?

- Overriding safety warnings can result in injuries and potentially life-threatening events





MRI BURN PREVENTION

Tips for Keeping Patients Safe

Screen patients for implants, devices, and other metallic objects. Assume anything unknown is MR Unsafe.



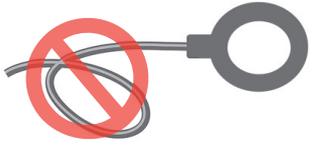
Screen objects to ensure that anything entering the scan room is MR Conditional or MR Safe. Match conditions on MR Conditional devices with your scanner. All metals, even non-ferromagnetic ones, have the potential to heat up and cause burns.

Have patients change out of street clothes whenever possible.



Position patients to avoid skin-to-skin contact (e.g. no hands on hips, no crossed arms, no crossed legs, etc.).

Always use the manufacturer-provided padding to insulate the patient. Sheets and blankets may be added for patient comfort but are not a substitute for manufacturer-provided padding.



Route cables out of the scanner in a straight line. Don't coil cables or allow them to touch the patient.

Use only Normal Operating Mode and the lowest SAR, whenever possible.



Keep your eyes and ears on the patient at all times. Stay in communication with patients to identify warming. Monitor sedated patients using MR Conditional monitoring equipment.





Magnetic Resonance Imaging

Tips for Scanning Patients with Implants



- Follow your site's process for screening the patient
- Identify the manufacturer and model of any implanted devices
- Locate the MRI safety information in the device manufacturer's labeling

Look for one of these icons:



MR Safe. Patients with MR Safe devices have no scanning restrictions.



MR Conditional. For patients with MR Conditional devices, implant conditions should be matched with the MR system information.

- Consult your MR system manual for MR system information
- Ensure that the MR system meets all conditions provided in the MR Conditional labeling
- If conditions are not met, the patient should not be scanned



MR Unsafe. Patients with MR Unsafe devices should not be scanned. Assume any unidentified implant is MR Unsafe.



- Document device information in the medical record
 - Consult a physician for any risk/benefit decisions
- For MR Conditional devices:
- Follow all pre-scan conditions, such as special programming modes

DURING

- For MR Conditional devices, follow all scan conditions such as specific absorption rate (SAR) restrictions or patient positioning instructions
- Monitor the patient at all times

AFTER

- Assess the patient for discomfort or injuries
- Follow any post-scan conditions, such as device checks or programming

Understanding MRI Safety Labeling

The MR environment has unique safety hazards for patients with implants, external devices and accessory medical devices. Implants, medical devices

and other equipment used in or near the MR

environment should be labeled as **MR Unsafe**, **MR Conditional**, or **MR Safe**.



MR Unsafe items should not enter the MRI scanner room. Patients with MR Unsafe devices should not be scanned.



MR Conditional items may safely enter the MRI scanner room only under the very specific conditions provided in the labeling. Patients should not be scanned unless the device can be positively identified as MR Conditional AND the conditions for safe use are met.

The conditions for safe use will be different based on the intended use of the device.

For **items intended to enter the bore of the MRI system**, the MRI Safety labeling should be matched with the MRI system for:

- Static field strength
- Maximum spatial field gradient
- dB/dt limitations (usually only applicable to active implants)
- SAR limits
- Any other conditions needed for safe use of the device, for example restrictions on the types of coils that may be used

When present, information about expected temperature rise and artifact extent may inform the risk/benefit decision of whether or not a patient should undergo an MRI examination. Expected temperature rise and artifact extent information are not conditions that must be met.

Items NOT intended to enter the bore of the MRI system usually have gauss line positioning restrictions or requirements to tether or affix the device to an unmovable part of the room.



MR Safe items pose no safety hazards in the MR environment. They may be placed anywhere in the MR environment. Patients with MR Safe devices have no scanning restrictions.