MRI Safety Screening and Clearance

Version 1.5

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Document History

Version Number	Date Version Finalized	Author	Summary of Updates
1.0	05/13/2025	Ayla Lazorcik	N/A-- Initial Draft
1.1	05/19/2025	Ayla Lazorcik	Suggested edits
1.2	06/10/2025	Ayla Lazorcik	Added Xray protocol
1.3	07/18/2025	Ayla Lazorcik	Added Glaucoma shunt, Cataract, and DJO implant information
1.4	07/30/2025	Ayla Lazorcik	Added heart valves and annuloplasty rings
1.5	09/30/2025	Ayla Lazorcik	Added IVC filter, coronary stent, and peripheral stent information. Edited DJO implant information, ILO guidance, and post-operative guidance.

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1. MRI Safety Screening and Clearance Overview

Document Goal:
To provide a standardized protocol for evaluating and clearing patients with known or suspected metallic implants or foreign bodies prior to MRI examinations, ensuring patient safety while minimizing unnecessary delays and patient dissatisfaction.

Intended Audiences for Document:
MRI technologists, MRI support staff, Radiologists, and Administrators

Associated Documents:
MRI Safety Screening Form
ACR Manual on MR Safety 2024
Attachment A: MRI Screening Best Practice Flowchart

Definitions:
MRI - Magnetic Resonance Imaging
EMR - Electronic Medical Record
IOL - Intraocular lens
SAR - Specific Absorption Rate

Email Contact to Ask Questions and/or Provide Feedback: help@imagen.ai

2. Screening Process

All patients must complete an MRI Safety Screening Form. It is recommended that this form be completed when scheduling with the patient. Patients with a history of metal exposure or implants must undergo a secondary review by an MRI technologist for clarification. The MRI technologist will review a thorough medical record and contact the patient before the MRI for additional medical history information, as needed.

Should the patient require subsequent imaging for MRI clearance (e.g., an Orbit X-ray), it is recommended that the X-ray be ordered and performed at least one day before the MRI appointment. A single view (water's view) will be obtained for Orbit x-ray.

Details collected should include (but are not limited to):

- Type of metal (e.g., surgical implant, injury, unknown)
- Date and location of placement/injury
- Prior MRIs post-metal exposure, with dates, facilities, and images if available
- Manufacturer information for the surgical implant, if known

Attachment A: MRI Screening Best Practice Flowchart is provided as guidance.

3. Metal Injury or Retained Fragment

If metal is in or near the orbital region, obtain a plain X-ray to assess the location.

X-ray Orbits must be obtained if any of the following criteria are met:

- Patient reports history of metal work (e.g., grinding, welding) without eye protection
- History of eye trauma with possible metallic foreign body
- Suspicion of orbital metal exposure without a definitive negative history

Fragments within or adjacent to the globe in the orbit are an absolute contraindication to MRI

An MRI technologist may clear a patient if metal is in a distal location (e.g., hand, foot), and:

- Not in proximity to the MRI scan site
- Not in proximity to large arteries or viscera
- The patient has had prior MRIs post-injury without issue
- No reported symptoms suggestive of magnetic migration (e.g., burning, pulling, pain during MRI)

If available, a ferromagnetic metal detector system (FMDS) device may also be used to clear the patient.

4. Implants

Obtain an implant card or surgical notes when possible.
Refer to the MRI Safety Manual (e.g., MRIsafety.com) to verify implant safety:

- MR Safe: No restrictions
- MR Conditional: Follow manufacturer guidelines
- MR Unsafe: MRI contraindicated

Passive Implants: Most passive implants (e.g., screws, plates, rods) made of titanium or other MRI-compatible materials are generally considered MR Conditional or MR Safe. However, always verify specific device information. If there is any uncertainty, escalate to the radiologist.

> **DJO Orthopedic Implants:** DJO implants do not come with explicit MRI safety labeling. Most are made of non-ferromagnetic materials and are considered MR Conditional in standard field strengths (≤3T). Artifacts and mild heating are expected but manageable. Recommended practice for MR imaging of DJO implants is as follows:
>
> - Obtain surgical information to identify manufacturer, model number, and implant materials
> - If unknown, classify as MR Conditional, document safety rationale
> - Use standard field strengths (≤3T)
> - Monitor SAR limits and patient comfort
> - Use optimized imaging sequences or metal artifact reduction techniques near implant sites
> - No restriction on the direction of the static magnetic field
> - No restriction on the value of the spatial gradient magnetic field
> - For a passive, internal orthopedic implant located inside the area of the transmitted RF energy, use a whole-body averaged SAR of 2-W/kg
> - For a passive, internal orthopedic implant located entirely outside of the area of the transmitted RF energy, there is no restriction for the RF energy
> - Maximum imaging time, 15 minutes per pulse sequence (multiple pulse sequences are allowed)
> - Document any issues

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Some orthopedic implants are excluded from the guidelines above including:

- External fixation systems
- External cervical fixation systems (e.g. halo vests)
- Traction devices
- Magnetically-controlled or programmable implants (e.g. PRECISE System, MAGEC System)
- Bone fusion stimulation systems
- Prosthetic limbs
- Prostheses with micropressors

Glaucoma Shunts: MRI safety classifications of glaucoma shunts vary by manufacturer and model. Specific MRI safety implant information should be verified prior to MRI imaging. General manufacturer guidelines for common glaucoma shunts are as follows:

- Ahmed Glaucoma Valve (New World Medical): Most models are MRI Conditional; safe at 1.5T or 3T
- Baerveldt Glaucoma Implant (Johnson & Johnson Vision): MRI Conditional
- Molteno Implant: MRI Conditional

Cataract/Retinal Surgery: Most patients who have undergone cataract or retinal surgery can undergo MRI safely. However, all implants or surgical materials should be verified for safety prior to MRI imaging. General guidance for intraocular lenses or other implant devices are as follows:

- Standard acrylic/silicone IOL: MR Safe
- PMMA IOL: MR Safe
- Metal-based IOLs: MR Conditional
- Sutures or Tension Rings: Usually MR Safe

Post-Operative MRI: It is generally recommended to wait at least 8 weeks post-operatively for routine MRI scans near a surgical site to allow for initial healing and reduce the risk of misinterpreting post-surgical changes as pathology. Intraocular implants are excluded from the 8-week waiting period. However, this timeframe may vary depending on the specific procedure, type of implant, and clinical urgency.

Urgent or emergent cases: If an MRI is medically necessary in the immediate post-operative period (i.e., less than 8 weeks), it may be performed at the radiologist's discretion in consultation with the referring physician. Clear communication regarding the post-operative status and any expected surgical changes is essential.

Specific implant considerations: Some newer implants have specific post-operative MRI timing guidelines from the manufacturer, which must be followed.

Heart Valves: Most modern heart valves are MRI-conditional. Mechanical valves are usually made of non-ferromagnetic materials like pyrolytic carbon, titanium, or stainless steel. Bioprosthetic valves typically contain little to no metal and are considered MRI safe or MRI-conditional.

Common MRI-conditional heart valves:

- St. Jude mechanical valves
- Edwards Lifesciences pericardial and porcine bioprosthetic valves
- Medtronic Hall, Hancock, and Mosaic valves

IVC Filters

Patients may be scanned according to manufacturer guidelines for the device. If documentation is missing or no MR safety guidance exists, patients may be scanned 6 weeks after implantation.

Coronary Artery and Peripheral Artery Stents

Patients may be scanned according to manufacturer guidelines for the device. If documentation is missing or no MR safety guidance exists, patients may be scanned 8 weeks after implantation.

Annuloplasty Rings/Bands: Most are MRI-conditional with labels specifying maximum MRI strengths, specific SAR limits, and duration.

Common MRI-conditional rings:

- Carpentier-Edwards Physio Ring (Edwards Lifesciences)
- Sorin Memo 3D Ring
- Medtronic Duran AnCore Ring
- St. Jude Medical (Abbott) Tailor Band

5. Escalation to Radiologist

Escalate clearance to a Radiologist in the following situations:

- Metal type or location is unclear
- Patient reports prior adverse MRI experience (e.g., burning, pulling, pain during MRI)
- No prior MRI documentation can be obtained, and the risk is uncertain
- MR screening can not be completed due to the patient's condition
- Verification of the passive implant is unable to be determined
- Ambiguity of post-operative timeframe and scan request
- The Radiologist contacted will be licensed and/or credentialed for the facility, making the inquiry, and does not need to be an MRI specialist. To reach a Radiologist, contact the Imagen Support Team: 917-900-3737 or toll-free 1-833-247-9729

6. Documentation

- Document clearance pathway in the patient chart
- If the patient is declined an MRI, contact the patient and the ordering provider to provide an explanation and refer to an alternative imaging modality as appropriate

7. References

ACR Manual on MR Safety 2024.
USCF Department of Radiology and Biomedical Imaging. MR Relative Contraindications.

-MRI Safety Screening and Clearance End-

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Attachment A: MRI Screening Best Practice Flowchart

Step 1: Patient Screening completed by Scheduler or Support Staff

- Complete MRI safety form at time of or soon after scheduling MRI
    - Determine if Orbital X-ray is needed
        - History of metal shavings, grinding, or welding without eye protection
        - History of eye injury with potential for retained metallic fragment
        - Unclear history but suspicion of orbital metal exposure
    - If any of the questions above are answered **Yes** ➔ Order X-ray of Orbits and instruct patient to have imaging performed, at minimum, the day prior to the MRI appointment
    - **Note:** Some EMR systems have the capability to send patient's MRI screening forms prior to the appointment and is recommended, if available

Step 2: Patient Screening review by MR Technologist - To be completed days prior to appointment, facility should determine timeframe (e.g. 3 days prior to appointment)

- Review Patient Screening Form
- Has the patient had an MRI *after* metal injury or placement?
    - **Yes** and no issues reported ➔ **Cleared for MRI**
    - **No**, or unclear ➔ Go to Step 3A or 3B
- **Is there an implant or injury-related metal (e.g., shrapnel, foreign body)?**
    - If **implant** ➔ Go to Step 3A
    - If **injury/fragment** ➔ Go to Step 3B

Step 3A: IMPLANT

- Identify device type, date, and location
    - Review patient medical record for pertinent information regarding device (e.g. surgical records, provider notes, prior imaging studies)
    - Contact patient as necessary to collect any missing information regarding device (e.g. what facility performed the implantation)
    - If unable to identify device from patient history or medical record, obtain surgical records from performing facility
    - If necessary information is unable to be obtained after utilizing all resources, escalate to a Radiologist
- Look up device in MRIsafety.com or internal implant database
    - **MR Safe** ➔ Proceed with MRI
    - **MR Conditional** ➔ Follow manufacturer conditions strictly

- **MR Unsafe/Unknown ➔** Do not perform MRI - inform patient and ordering provider

Step 3B: RETAINED METAL (e.g., from trauma)

- Is metal **near the orbital region**?
  - **Yes ➔** Has Orbit X-ray been obtained and resulted?
    - **Yes ➔** Are there metal fragments near the orbital region?
      - **Yes ➔** Do not perform MRI - inform patient and ordering provider
      - **No ➔ Cleared for MRI**
    - **No ➔** Has the X-ray been performed but not resulted?
      - **Yes ➔** Escalate to a Radiologist
      - **No ➔** Instruct patient to arrive one hour prior to the appointment time to have a STAT Orbit X-ray for clearance
  - **No** (e.g., distal hand/foot) **➔ Cleared for MRI**

Step 5: Clearance

- Has the patient been cleared for MRI?
  - **Yes ➔** Document clearance in patient's medical record with supporting information (e.g. prior MRI history, device information, X-ray clearance, etc.)
  - **No ➔** Is MRI clearance denied due to implant device guidelines or positive orbit X-ray?
    - **Yes ➔** Contact patient to cancel MRI, inform ordering provider, document rationale and communication in patient's medical record
    - **No ➔** Escalation to Radiologist for final determination; contact patient and ordering provider as needed, document outcome in patient's medical record
- Escalation to Radiologist (when needed)
  - Contact Imagen Support to discuss MRI clearance: 917-900-3737 or toll-free 1-833-247-9729