DEPARTMENT OF
Radiology
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

MEMO: Guidelines for MRI Clearance of Patients with Metallic Implants of Uncertain Identity

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From: MRI Safety Subcommittee on Metallic Implants of Uncertain Identity
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To: The Department of Radiology

The purpose of this document is to establish a systematic approach for safely performing MRI exams of patients with metallic implants of uncertain identity. In all MRI facilities, a recurring challenge occurs whereby MRI safety screening procedures identify a patient with an implanted metallic object of uncertain/unknown identity. Despite the best attempts of the MRI safety team, there are many situations where accurate identification of the implant cannot be determined.

Standard procedure and published guidelines (e.g., ACR MRI Safety Guidelines) recommend that the identity of the object be ascertained to determine whether the patient can enter the MRI environment and be scanned safely. However, it is also widely appreciated and noted in the ACR guidelines that in many circumstances the risk of injury to the patient is very low and outweighed by the diagnostic information that would be provided by the MRI exam. Therefore, it is acceptable, under local guidelines, to perform the MRI study despite incomplete information regarding the exact nature of the metallic implant. Unfortunately, there are understandable inconsistencies in the algorithm determining which patients can safely undergo MRI procedures and which patients should not. For this reason, there is an unmet need to provide a standardized approach to ensure that important safety principles are followed, while balancing the need to obtain important diagnostic information essential for guiding treatment of the patient.

The MRI Safety Committee has reviewed and approved the following principles for scanning patients with metallic implants of uncertain identity:

1. All attempts should be made to obtain written documentation to identify specific implants. The procedures outlined in this document and subsequent addenda should never replace good faith attempts to identify an implanted device.
2. If the identity of the metallic implant is determined, but there are no published MRI safety recommendations, the guidelines suggested by this memo can be used.
3. The UW MRI Safety Committee will follow published MRI safety guidelines as closely as possible (Kanal et al JMRI 2013 and any future updates). These guidelines recognize that the need to obtain diagnostic information may outweigh the potential risk of injury in some circumstances. The committee also understands that it is standard of care at many institutions to scan some patients with implanted devices of unknown origin in appropriate situations. A standardized approach is advocated to mitigate uncertainty associated with this approach.
4. Informed consent is neither required nor recommended for this approach, since, by definition, implants discussed in this document are of unknown identity and, therefore, the specific risk of injury is unknown.
5. A successful prior MRI exam is not sufficient to “clear” any metallic implant whose identity is known or unknown. This principle applies broadly to MRI safety practices.
6. Consideration should be given to limiting scanning to 1.5T in these patients.
7. If questions regarding the safe scanning of a patient remain following the screening process, the attending radiologist from the section interpreting the exam should be consulted. If not available, or if there are questions, the Chair of the MRI Safety Committee or the Medical Director of MRI may approve proceeding with the exam, but will communicate this to a member of the relevant section, preferably the relevant Section Chief. “Shopping” for an attending willing to approve a

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procedure if there are questions about the safety screening is inappropriate. Remaining concerns should be brought to the Chair of the MRI Safety Committee or the Medical Director of MRI.

8. The use of radiography or CT to identify the nature and location of metallic implants (e.g., location of shrapnel in patients with known gunshot wounds) may be appropriate. This is already performed routinely in patients identified at risk for ocular metal foreign bodies. The use of radiography in unconscious patients with no known medical history may also be appropriate. Thorough documentation of findings from radiographs obtained for the purpose of metallic implant detection or characterization should be made to avoid unnecessary repeat radiographs for future MRI exams (unless new metallic implants are placed).
9. Consideration for alternative diagnostic methods should be made, depending on the nature of the clinical question, availability of alternative diagnostic methods and the potential risk from the metallic implant.
10. Individuals accompanying a patient (e.g., a parent) may not enter Zone 4 (scanner room) if they have a metallic implant of unknown identity, unless this is addressed specifically by one of the general classes of implant (below).
11. Scanning of patients with metallic implants of unknown identity should not be performed in research subjects, unless explicitly permitted under an IRB approved protocol.
12. In general, no waiting period is necessary for patients who have recently undergone procedure/implant placement prior to their MRI. Notable exceptions include recent pacemaker lead placement (please see “Pacemaker Guidelines”) and recent tattoos.

It is also recognized that patients are often aware that they have a general class of metallic implant (e.g., shrapnel, coronary stent, etc.), but have no information on the specific make or model. Even when medical records can be obtained, they often do not contain the necessary information. However, knowledge of the general class of implant can help guide whether to scan the patient, even when the specific make, model or other relevant information is not available. Based on the general safety profile of these classes of implants, general approaches to MRI scanning will be developed by the subcommittee and reviewed by the larger MRI Safety Committee for approval. Please note that specific protocols are already in place for cardiac pacemakers, ocular metallic foreign bodies and GI clips.

The following represent classes of implants that the committee has determined ***cannot*** be scanned safely unless the identity of the implant is determined and documentation regarding the safe use of MRI with those implants is obtained:

1. Recently-developed guidelines for cardiac pacemakers and ICD devices include consideration for pacemakers of unknown identity. Please see those guidelines.
2. All non-cardiac stimulator and pump devices (including ventriculostomy pumps) that contain electronics and/or electronic leads, as well as abandoned leads, will not be permitted for any MRI scanning, unless the specific device can be identified and there are guidelines and procedures available from the manufacturer for safe MRI scanning.
3. Patients with neurovascular aneurysm clips of uncertain identity will not be scanned.

The following classes of implants have been reviewed by the subcommittee and guidelines regarding specific safety recommendations have been addressed in the Appendix A and B (see attached):

1. Orthopedic hardware, including recent surgery.
2. Coronary artery stents.
3. Cardiac valves.
4. Non-coronary vascular and biliary metallic stents, endostents, IVC filters and non-neuro embolization coils.
5. Neuro-embolization coils.
6. Shrapnel, non-medical metallic foreign bodies, etc.

7. Unresponsive patients with inadequate medical records needed to confirm the absence of metallic implants.
8. EENT implants including: scleral buckles, ocular implants, cochlear implants, middle ear prostheses.
9. Metallic piercings, tattoos and other metallic cosmetic materials / devices.
10. Intra-uterine devices (IUDs).

Subgroups of the committee with expertise in clinical areas relevant to these implants will meet, review the literature and make standardized recommendations that will form an addendum to this document. Furthermore, as new types or classes of devices arise or become more clinically relevant, additional groups of metallic implants may be appended to this document. All recommendations must be reviewed and approved by the MRI Safety Committee.

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