

What's New in the Patient Safety World

October 2020

New Warnings on Implants and MRI

In our many columns on patient safety issues in the MRI suite, issues related to implants have often been stressed. Certain implants can become heated during MRI scans, they may become dislodged, or they might malfunction.

Analysis of an FDA database revealed over 600 adverse events related to **implantable hearing devices** during MRI scanning over a 10-year period ([Ward 2020a](#)). Most were cochlear implants, but a few were middle ear implants or bone conduction implants and 2 were brainstem implants. The most common cause of the adverse events was dislocation of the magnet in the implantable device, often causing pain. This often leads to premature cessation of the MRI study. In some cases, manufacturer protocols may allow removal of the magnet prior to the MRI but some events occurred even when following manufacturer guidelines. Headbands or splints are recommended by manufacturers in some cases but, even then, adverse events sometimes occurred. Rarely, there was malfunction of the implanted device. Also, implantable devices may lead to artifacts that make interpretation of certain areas difficult.

Thermal burns are the most common adverse MRI event in an FDA database ([Forrest 2020a](#)) but most of these are related to superficial devices like coils and EKG leads. Yet even deep implants that have ferromagnetic properties can heat and cause internal thermal injuries. But reassuring was a recent study showing that clinicians can safely perform clinical 3-tesla MRI scans with metal artifact reduction sequence (MARS) protocols on patients with hip arthroplasty implants without excessive thermal heating of the devices ([Forrest 2020b](#)). On the other hand, the thermal effects due to the switching of gradient coil (GC) fields on metallic hip implants has been less well studied ([Ward 2020b](#)) For the echo-planar imaging (EPI) sequence, which is needed to perform functional MRI and diffusion-tensor imaging, heating is strongly dependent on the position of the body within the scanner. The researchers found almost no heating when the implant is at $z \approx 0$ from the scanner center, whereas the worst cases occur with $z \approx 300$ mm

All the more important that we always ascertain the presence of any implant in a patient prior to undergoing an MRI scan.

Some of our prior columns on patient safety issues related to MRI:

- February 19, 2008 “[MRI Safety](#)”
- March 17, 2009 “[More on MRI Safety](#)”
- October 2008 “[Preventing Infection in MRI](#)”
- March 2009 “[Risk of Burns during MRI Scans from Transdermal Drug Patches](#)”
- January 25, 2011 “[Procedural Sedation in Children](#)”
- February 1, 2011 “[MRI Safety Audit](#)”
- October 25, 2011 “[Renewed Focus on MRI Safety](#)”
- August 2012 “[Newest MRI Hazard: Ingested Magnets](#)”
- October 22, 2013 “[How Safe Is Your Radiology Suite?](#)”
- October 21, 2014 “[The Fire Department and Your Hospital](#)”
- August 25, 2015 “[Checklist for Intrahospital Transport](#)”
- August 2016 “[Guideline Update for Pediatric Sedation](#)”
- October 2016 “[MRI Safety: There’s an App for That!](#)”
- January 17, 2017 “[Pediatric MRI Safety](#)”
- August 8, 2017 “[Sedation for Pediatric MRI Rising](#)”
- March 2018 “[MRI Death a Reminder of Dangers](#)”
- March 2018 “[Cardiac Devices Safe During MRI But Spinners!?](#)”
- November 2018 “[OMG! Not My iPhone!](#)”
- April 2, 2019 “[Unexpected Events During MRI](#)”
- September 2019 “[New MRI Hazard: Magnetic Eyelashes](#)”
- October 15, 2019 “[Lots More on MRI Safety](#)”
- November 5, 2019 “[A Near-Fatal MRI Incident](#)”
- November 2019 “[ECRI Institute’s Top 10 Health Technology Hazards for 2020](#)”
- January 7, 2020 “[Even More Concerns About MRI Safety](#)”
- March 2020 “[Airway Emergencies in the MRI Suite](#)”

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