

## **UW Health Radiology Guidelines for MRI in Patients with Common Complex Devices: Available Hours, Personnel Required & Other Considerations.**

Updated 4/23/2019 – K. Vigen, K. Bybee, H. Rowley

This summary is meant to serve as a general guideline to insure safety for patients with complex devices being referred for MRI. Guidelines may change over time; published data and manufacturer's labeling should be consulted. If a referral is made after hours or on the weekend, exceptions will be considered only when appropriate personnel are available, the information cannot be obtained another way, and medical necessity requires urgent MRI.

### **MR Conditional CIEDs (Pacemakers, ICDs, CRT-Ds)**

- MRI available Monday-Friday, 8am-5pm; University Hospital Only.
- 1.5T Only; for Cardiac MRI, UWMR3/4 only. (3T possible if device is labeled appropriately, e.g. for PET/MR.)
- Required Personnel: Cardiac Device Clinic Nurse (Programming); MRI Nurse (Monitoring).
- Recommended Personnel: MR Physicist (Cardiac/Thoracic/Shoulder studies only).
- Cardiac/Thoracic MRI: Use Cardiac Pacemaker/ICD Protocol.

### **Conventional/Legacy CIEDs (Pacemakers, ICDs, CRT-Ds) – BY UW MRI SAFETY COMMITTEE APPROVED GUIDELINES**

- MRI available Monday-Friday, 8am-5pm; University Hospital Only.
- Patient consented and consent form to be signed by EP Attending/Fellow/APP -AND- Radiology Attending/Fellow.
- 1.5T Only; for Cardiac MRI, UWMR3/4 only.
- Required Personnel: Cardiac Device Clinic Nurse (Programming and Monitoring); EP Physician Attending/Fellow, APP (Consent, and monitoring if required); Radiology Attending/Fellow (Consent); MR Physicist (Beginning of scan).
- Cardiac/Thoracic MRI: Use Cardiac Pacemaker/ICD Protocol.

### **Deep Brain Stimulator (DBS) – Head-Only Devices (Medtronic)**

- MRI available Monday-Friday, 8am-5pm; other hours (e.g. ER cases) if patient can manage device on their own.
- Use Low SAR Protocol OR Low SAR Mode on UWMR3/4 (Head SAR = 1.0 W/kg).
- Transmit/Receive Head Coil Only.
- Use DBS Worksheet for complete workflow.

### **Deep Brain Stimulator (DBS) – Full-Body Eligible Devices (Medtronic)**

- MRI available Monday-Friday, 8am-5pm; other hours upon personnel availability.
- Required Personnel: Neuro Device Clinic needs to program and check device before and after scan.
- Recommended Personnel: MRI Physicist, if done during business hours.
- Any RF Coil at UW is allowed, even for head scans.
- Low SAR Mode,  $B_{1+RMS} = 2.0uT$ .
- Device labeled for 30 min scan max (imaging time, not counting pauses); radiologist needs to approve longer scans.
- Use DBS Worksheet for complete workflow.

### **Livanova (Cyberonics) Vagal Nerve Stimulator (VNS) – Local Transmit/Receive Only (Group B) Devices**

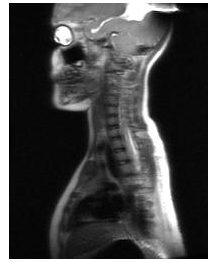
- MRI preferred Monday-Friday, 8am-5pm; other hours as needed.
- Required Personnel: Neurology NP or Neurologist needed to program device.
- Transmit/Receive Head Coil (or T/R extremity coil) required.
- MR scan excluded if T/R head cannot be used (Body Coil Transmit, e.g. spine, body, etc.)

### **Livanova (Cyberonics) Vagal Nerve Stimulator (VNS) – No Special Equipment/Coils (Group A) Devices**

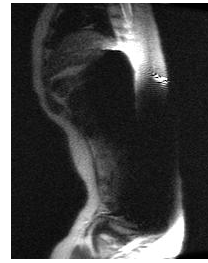
- MRI preferred Monday-Friday, 8am-5pm; other hours as needed.
- Required Personnel: Neurology NP or Neurologist needed to program device.
- Transmit/Receive Head Coil (or T/R extremity coil) required.
- Device labeled for 15 min scan per 30 minutes of table time (dead time may include time between scans).
- MR scan excluded if center of FOV is inside C7-T3; a limited scan may be possible with MR Physicist assistance.

### Magec Rods

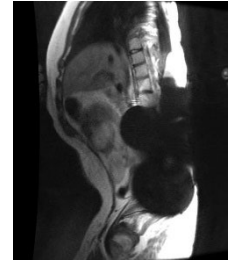
- 1.5T Only; Quick Brain Scans OK 24/7. ("Very Low SAR Quick Brain" protocol on UWMR3/4.)
- Other exams (including spines) are Mon-Fri, 8am-5pm: requires MR Physicist.
- Be aware of significant unrecoverable artifact surrounding the magnets in the device:



3pl Loc-Top



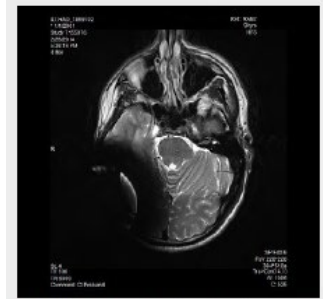
3pl Loc-Bot



MAVRIC - Bot

### Cochlear Implants

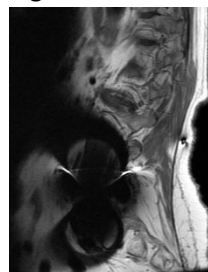
- Some older cochlear implants are MR Unsafe. Newer cochlear implants are most often MR Conditional for 1.0 W/kg at 1.5T (Low SAR Mode).
- Prefer 1.5T, due to length of exams in Low SAR Mode; and for head scans, slightly smaller artifact.
- Image artifacts from implanted magnet can obscure neuroanatomy.
- Rarely, the magnet is easily removable.
- Most often, magnet removal requires surgical procedure.



### Nevro Senza Spinal Cord Stimulator

- MRI available Mon-Fri, 8am-5pm; Univ Hospital Only.
- 1.5T Highly Preferred. (3T has severe limitations.)
- Required Personnel: Nevro Rep (device programming) **-AND-** MRI Physicist (Low SAR settings).
- Low SAR mode; SAR set based on device instructions.
- SAR limit of 0.4 W/kg for torso/spine scans, cannot be set on GE systems; use 0.5 W/kg instead for WB-SAR.
- Device labeled for 30 min max; radiologist needs to approve longer scans.

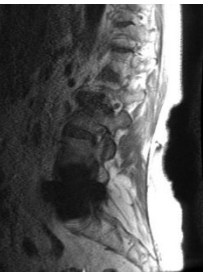
Significant artifact around device:



Sag T1 FSE



Sag PD FSE



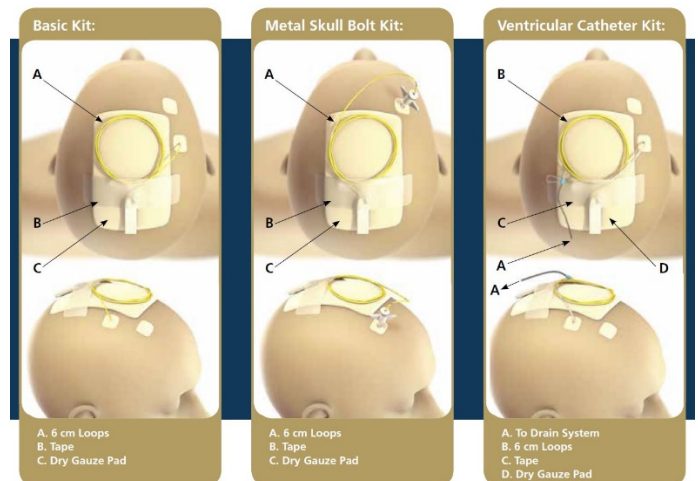
Sag Mavric

### Codman ICP

- 1.5T or 3T; SAR Normal Mode; **\*NO\* T/R Head Coil**; Body Coil Transmit ONLY (8ch brain, GEM HNU, Spine coil, etc).
- Device must be functioning properly prior to MRI.
- Neurosurgery must document that device lead is coiled per manufacturer guidelines: →
- MRI technologists will not allow patient into the scanner if end of lead (connector) is below the ear.

### Raumedic ICP Devices (both with lead and leadless/telemetric)

- MR Conditions not FDA approved; see UW worksheet.
- For device with leads, must be coiled similar to Codman ICP monitor.



### General Low SAR Devices (not listed above).

- Notify MR Physicist if exam performed Monday-Friday, 8am-5pm, due to possible issues with GE's Low SAR mode.
- Can be performed after hours, if technologist is comfortable scanning with Low SAR mode.
- DV/Premier scanners only (e.g. UWMR3-6, AFCHMR1, TACMR1/2, RP3/4).
- 1.5T is often preferred; as scan/exam times can greatly increase using Low SAR mode at 3T.