Metal Artfact Suppression

Excellent Depiction of Tissue in the Presence of Metal

Though established as the preferred imaging modality for visualizing soft tissue throughout the body, a well-known challenge in MRI comes from imaging soft tissue adjacent to metallic implants.

Metal in an MRI field of view can cause severe artifacts (distortions) because of its vastly different magnetic susceptibility compared to surrounding tissue. While the soft tissues that are located further from the metallic implant might be depicted well on MR images, image quality and interpretation of the bone and soft tissues directly adjacent to metal prosthesis can dramatically limit diagnosis and detection of abnormalities, inflammation, infection, or displacement.

As many as 10% of all MRI exams are performed on patients with a metallic implant, devices that range from smaller orthopedic screws in the wrist or ankle, to larger prostheses that replace the knee or hip entirely. Though larger implants may be more likely to suffer from distortions due to their size, any metallic implant can cause unwanted image artifacts.

To manage metallic implant imaging effectively, imaging providers need easy-to-implement tools that can be broadly applied across their diverse patient (and patient implant) population. Hitachi provides two proven methods that meet these criteria, allowing successful imaging in the presence of metallic implants.

PrimeFSE and PrimeFIR

Acquisition parameters are adjusted by increasing the bandwidth of the excitation pulse and signal readout, while reducing echo spacing.

- Reduces through-plane and in-plane distortion
- Fast acquisition times – less than 4 minutes in many cases
- Flexible acquisition parameters allow T2, T1, Proton Density or Inversion Recovery weighting
- Standard (available on all Hitachi MRI platforms)

FatSep

FatSep (Dixon method) depends on in/out of phase times of fat and water, which are less sensitive to local inhomogeneities caused by metal implants.

- Fast acquisition time
- Particularly useful for Body or MSK imaging
- Good alternative to conventional RF fat saturation
- Option (available on all Hitachi MRI platforms)

Note: MRI scanning of patients with implants is indicated only when the implant is labeled by the manufacturer as MR Safe or MR Conditional. For MR Conditional devices, the scanning environment must comply with the conditions for safe scanning as stated by the manufacturer. Any device that is not labeled MR Safe or MR Conditional must be assumed to be MR Unsafe and should not be scanned.
**METAL ARTIFACT SUPPRESSION**

**primeFSE & primeFIR**

Conventional RF FatSat (left) displays noticeable blooming artifacts obscuring the area of interest. FatSep FSE (right) minimizes blooming effect for improved visualization.

**FatSep**

T1 FSE images acquired in less than 4 minutes with user defined bandwidth optimized for artifact reduction with excellent depiction of ligaments and cartilage.

T2 FSE axial provides visualization of soft tissue surrounding the implant.