## MRI Safety Hazard from Undetected Metal Thread in Clothing

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**Case report**: An adult woman presented to the hospital for a routine outpatient lumbar magnetic resonance (MR) examination. Pre-examination safety screening was performed and the patient was cleared for MR imaging. The patient was placed in a 1.5 T whole body scanner. After performing the first sequence, a fast spin echo T2-weighted sagittal image of the lumbar spine, the patient complained that her skin was hot. The technologist removed the patient from the scanner and found that the patient's shirt was burned (see photograph). Examination of the label on the shirt revealed the presence of metal thread. The metal was not apparent to the patient or the MR technologist prior to the examination. As seen on the enlarged photograph, the metal thread is not readily apparent on visual inspection.

**Discussion:** Metal wires in contact with a patient's skin have long been recognized as a safety hazard during MR examinations.<sup>1</sup> The metal wires can form resonant loops which absorb radiofrequency energy resulting in thermal injury to the patient.<sup>2</sup> Monitoring leads are typically isolated from contact with a patient's skin in order to avoid burns. Any metal which is a part of the patient's clothing carries a similar risk of thermal injury. For this reason MR safety screening protocols include instructions to remove clothing with metal threads or snaps.<sup>3</sup> In most cases the metal thread is clearly visible as a decorative element of the clothing.

Lurex is a thread with aluminum coating used in clothing. The aluminum coating is a radiofrequency conductor. Clothing woven with metal (lurex) thread therefore presents a hazard to patient if worn during MR examination.<sup>4</sup> As demonstrated in this case, the metal thread may not be readily apparent on examination of the fabric. A case report from 1987 described susceptibility artifact due to steel thread woven into a patient's pants.<sup>5</sup> However, a literature search revealed no previous case reports of burns due to metal thread woven into garments.

**Conclusion:** Any clothing with metal (lurex) thread should be removed prior to MR imaging. Because of the apparent difficulty of recognizing the presence of metal thread in clothing, MR facilities should consider requiring patients to change into a metal free cloth gown prior to any MR examination.



<sup>1</sup>Dempsey MF, Condon B. Thermal Injuries Associated with MRI. Clin Radiol 56:457-65; 2001.

<sup>2</sup> Dempsey MF, Condon B, et al. Investigation of the Factors Responsible for Burns during MRI. *J Magn Reson Imaging* 13:627-31. 2001.

<sup>&</sup>lt;sup>3</sup> Shellock, Frank G. *Reference Manual for Magnetic Resonance Safety, Implants, and Devices.* Los Angeles, CA: Biomedical Research Group, 2007. 40-41.

<sup>&</sup>lt;sup>4</sup> Bright, Anne. *Planning and Positioning in MRI*. Chatswood, N.S.W.: Elsevier Australia, 2011. viii.

<sup>&</sup>lt;sup>5</sup> James R, Bartlett CR, et al. Unusual MR metallic artifact due to steel threads. J Comput Assist Tomogr 11:722-3;1987.