Whole-Body Magnetic Resonance Imaging: Protocol Pictorial Example

Ressonância de Corpo Inteiro: Exemplo Pictórico do Protocolo

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Dear editor,
This letter aims to complement the previously published article "Whole-Body Magnetic Resonance Imaging – What is it and How Can it be Useful?" in which this promising magnetic resonance (MR) technique, allowing imaging of the entire body in a single session, is described.

There has been an increasing number of studies describing the use of this technique in the oncology setting proposing adapted MR protocols to patients with known particular cancers to detect metastasis or to establish the extension of the disease.[1,2] The imaging protocols are composed of multiple sequences that need to be analyzed and interpreted in a combined manner customized accordingly to the clinical scenario.

To give a more comprehensive perspective, this letter reflects a pictorial example of the whole-body-MR protocol proposed by international multidisciplinary experts for cancer screening in individuals at high risk for cancer, including those with cancer predisposition syndromes.[3] Imaging can be performed both with 1.5- or 3-T scanners, with a scan time under one hour. The standard protocol includes whole-spine sagittal T1- and T2-weighted imaging with fat suppression (preferably short in- version time inversion-recovery due to the large field of view), axial T1-weighted, T2-weighted, and diffusion-weighted (DW) images, with anatomic coverage extending from the vertex to lower limbs, including proximal upper limbs. Axial T2-weighted imaging with fluid-attenuated inversion recovery for brain and gradient-echo T1-weighted high-spatial-resolution imaging for lung assessments is also performed (Fig. 1).

It is recommended that T1-weighted acquisitions is performed using the Dixon technique, allowing relative fat fraction (FF) images to be calculated from fat only (F) and water only (W) reconstructions, using the following formula: [F/(F+W)] X 100. FF has been used as a quantitative tool for assessing nodal and bony disease as FF lowers in rh setting of bony or lymph node metastases compared to normal structures.[4]If suspicious lesions are found, complementary dedicated studies might be necessary to clarify the findings.

For this technique to grow as a reliable imaging tool it is necessary that radiologists become used to read the large number of sequences obtained and to be familiar with the wide range of normal, non-pathological findings. Nevertheless, it is essential that also clinicians see whole-body-MR as a valid tool.

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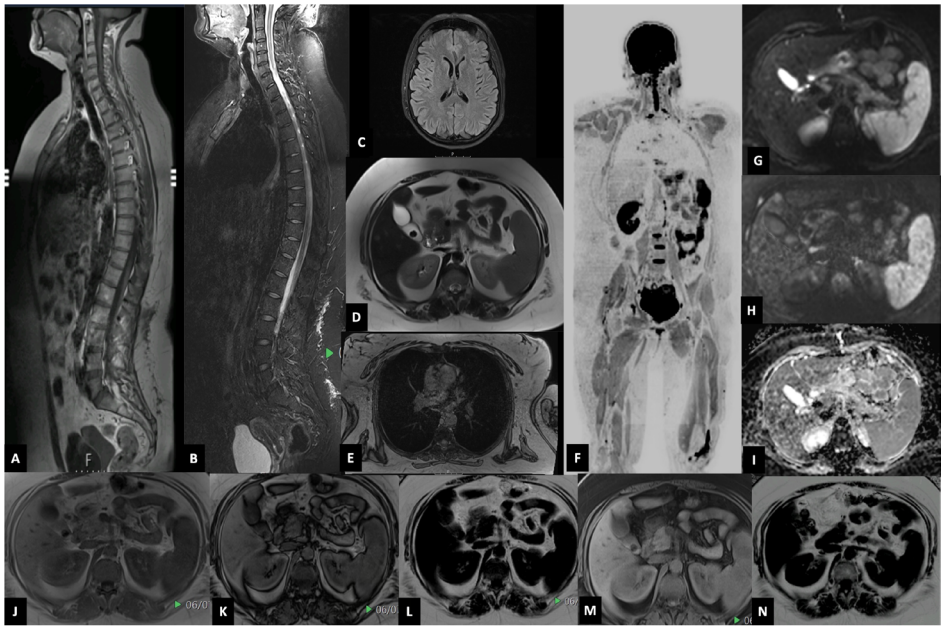

Figure 1. Magnetic resonance imaging (MRI) scans illustrating the typical protocol for a whole-body MRI examination.
A. Sagittal whole-spine sagittal T1-weighted turbo spin-echo image of the spine.
B . Sagittal short inversion time inversion-recovery (STIR) T2-weighted turbo spin-echo image of the spine.
C. Axial T2-weighted fluid-attenuated inversion recovery (FLAIR) image of the brain.
D. Axial T2-weighted turbo spin-echo (TSE) im- age at the level of the upper abdomen.
E. Axial gradient-recalled echo (GRE) T1-weighted image of the lung.
F. Diffusion-weighted (DW) image with *b* value of 900 sec/mm2 (B900) stack was reconstructed as a three-dimensional maximum intensity projection (MIP) image and displayed using in the coronal plane in an inverted gray scale.
G. Axial DW images obtained with *b* values of 50 sec/mm2 (b50) and H. 900 sec/mm2 (b900) and I. corresponding apparent diffusion coefficient (ADC) map.
J. In-phase, K. opposed-phase, L. fat-only, and M. water-only images from axial T1-weighted gradient-recalled echo MRI with Dixon technique and N. relative fat fraction map (rF%).

Responsabilidades Éticas

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