

## Challenges in Adherence to Magnetic Resonance Imaging Consensus Recommendations in Multiple Sclerosis: A Call for Improved Neurologist-Neuroradiologist Collaboration

### Desafios na Adesão ao Consenso de Recomendações sobre a Ressonância Magnética na Esclerose Múltipla: Apelo à Melhoria da Colaboração Neurologia-Neuroradiologia

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#### INTRODUCTION

##### The consensus on MRI in multiple sclerosis

Despite major treatment advances in multiple sclerosis (MS), neurologists still face some challenges: the delay in diagnosis and the monitoring of disease progression. Magnetic resonance imaging (MRI) plays an essential role in the clinical management of MS, aiding in the diagnosis, monitoring disease activity, and assessing treatment effects. In 2018 and 2020, the MS Study Group and the Portuguese Society of Neuroradiology published comprehensive guidelines for the use of MRI in MS, detailing the crucial information that neurologists should provide when requesting MRIs (part 1), as well as the suggested MRI acquisition protocols and the structure and content of neuroimaging reports from neuroradiologists (part 2).<sup>1,2</sup>

The recommendations specify that neurologists should provide detailed clinical information when ordering MRIs. For diagnostic scans, this includes symptom onset, clinical signs, and any pertinent history that may affect differential diagnoses. For follow-up scans, the purpose, clinical course, disease-modifying treatment (DMT) history, and any special patient needs, such as claustrophobia, should be noted.<sup>1</sup> On the neuroradiologist's side, the protocol should include non-gapped sequences in the brain and spinal cord at a minimum magnetic field of 1.5 Tesla and assessment should include identification of lesions using two different sequences.<sup>2</sup> Additionally, the report must comprehensively describe the MRI technique, including the magnetic field strength, anatomical coverage, sequences used, gadolinium administration, and comparison with previous imaging when available. The imaging findings section should report lesion distribution, load, gadolinium-enhanced lesions, atro-

phy, and incidental findings. The conclusion should provide a clear interpretation of whether the MRI criteria for dissemination in space (DIS) and time (DIT) are met accordingly to the McDonald 2017 criteria<sup>3</sup>, along with an assessment of disease progression or any therapeutic complications.<sup>2</sup>

##### Study overview: compliance with MRI recommendations

The primary aim of the study published in this issue of Acta Médica Portuguesa was to assess the compliance with the Portuguese consensus on MRI usage in MS.<sup>4</sup> The study was observational and retrospective, spanning data from seven hospitals across the country. A total of 242 patients diagnosed with MS between February 2019 and December 2022 were included, with 732 MRI requests and reports analyzed. Compliance was assessed across three categories: the clinical information provided in MRI requests, the neuroimaging protocol followed during MRI acquisition, and the content of MRI reports.

The results showed significant discrepancies in compliance, particularly regarding the clinical information provided by neurologists in the MRI requests and the completeness of neuroradiologist reports. Only 28.8% of diagnostic MRI requests fully met the recommended criteria, and follow-up MRI requests fared even worse, with only 3.7% achieving full compliance. Similarly, MRI reports were also incomplete, with less than 5% of diagnostic reports covering all the required elements.

The study also compared the period before and after the publication of the second part of the MRI recommendations in 2020. While there was a notable improvement in the

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specification of MS phenotype in follow-up MRI requests, other areas showed no significant changes. Furthermore, the study compared compliance between public and private healthcare settings. Public hospitals had higher compliance with mandatory MRI sequences, but private hospitals outperformed public institutions in certain aspects of reporting, such as lesion topography and disease progression.

### The neurologist's perspective

From the neurologist's perspective, the importance of adhering to MRI guidelines is essential. The quality of the neuroimaging report is heavily influenced by the clinical information provided when ordering an MRI. A description of symptoms, disease history, and any relevant comorbidities or special needs enables the neuroradiologist to tailor the MRI protocol to the patient's specific case. This collaboration is crucial for interpreting subtle findings in MS, where lesions and disease progression can sometimes be difficult to discern. This study highlighted a significant gap in this communication, with nearly 30% of diagnostic MRI requests lacking essential clinical details.

As MS management grows more complex, with evolving treatment regimens, it is vital for neurologists to provide clear and complete information for both diagnostic and follow-up MRIs. The new McDonald 2024 diagnostic criteria (Montalban X *et al*, 2024 – oral communication soon to be published) further emphasize this need by allowing for MS diagnosis in the context of a typical clinical presentation with just four topographies of typical demyelinating lesions, or even in the absence of MS-specific symptoms, with only two topographies involved, as long as at least six lesions (or the majority, if fewer than six) show a central vein sign, an emerging radiological MS biomarker. Notably, the requirement for dissemination in time (DIT) is no longer mandatory for diagnosis. This shift reduces reliance on symptom-based diagnosis and leverages the significance of high-quality MRI data. Therefore, neurologists need to receive detailed, standardized feedback from trusted neuroradiologists to ensure that MRI findings are interpreted accurately and can inform timely, confident clinical decisions.

### The neuroradiologist's perspective

From the neuroradiologist's perspective, the adequate interpretation of MRI findings relies heavily on the consistency and reproducibility of imaging protocols and reporting. It is vital to implement protocols that enable reliable longitudinal comparisons and disease monitoring, alongside accurate reporting of both technical parameters and imaging findings. While this study demonstrates that the majority of brain and spinal cord MRI examinations included all mandatory sequences (82.5% and 71.1%, respectively), it also revealed poor compliance with technical requirements, which

were met in fewer than 1% of the reports. This is concerning, given the established impact of the magnetic field strength, the accuracy of different sequences, and the timing delay of post-gadolinium acquisitions on the sensitivity for detecting and interpreting MS-related abnormalities on MRI.<sup>5</sup> Overall, these findings underscore the need to increase awareness of consensus recommendations for neuroimaging in MS to achieve higher standards of reporting.

Furthermore, neuroradiologists should recognize that MS is an evolving field, and as patient monitoring increasingly targets more complex processes, such as neurodegeneration and smoldering inflammation, the demands on neuroimaging will continue to grow. The upcoming diagnostic criteria will introduce new lesion topographies and specific imaging features – central vein sign and paramagnetic rim lesion, another emerging radiological MS biomarker – to diagnose MS, which will require the addition of dedicated sequences into imaging protocols and the inclusion of additional information in MRI reports. These coming changes highlight the need to revise the existing consensus recommendations and suggest that future guidelines will involve more complex protocols and more comprehensive reporting standards. Consequently, multidisciplinary collaboration is becoming increasingly important, and neuroradiologists and neurologists should be encouraged to work closely together.

### Improving MRI practices in MS

In conclusion, the results of this study suggest that, while some progress has been made in aligning clinical practice with the Portuguese consensus on MRI in MS, significant gaps remain. These gaps highlight the need for further improvements in the communication between neurologists and neuroradiologists.

Magnetic resonance imaging has become a fundamental tool in the evaluation of MS, particularly with the emergence of new biomarkers like the central vein sign and paramagnetic rim lesions, which enhance diagnostic specificity. The upcoming McDonald 2024 diagnostic criteria will place even greater emphasis on MRI, underscoring the need to reflect on how we can optimize the MRI workflow in MS care. This study is a call for standardized, high-quality MRI protocols and reports, which are essential for accurate and timely MS diagnosis, treatment planning and follow-up.

### AUTHOR CONTRIBUTIONS

MDS: Conceptualization and writing of the manuscript.

DB: Writing and critical review of the manuscript.

All authors approved the final version to be published.

### COMPETING INTERESTS

MDS has received speaker honoraria from Novartis and

Merck, has participated in an advisory board of Roche and has received support for attending scientific meetings from Bristol-Myers Squibb, Merck, Pfizer, Roche, and Sanofi.

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