Recommendations for the coordination of Neurology and Neuroradiology departments in the management of patients with multiple sclerosis

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Poster Number: P0631

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Poster Presentation at the 8th Joint ACTRIMS-ECTRIMS Meeting, MSVirtual 2020, September 11–13, 2020

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Sara Llufriu has received compensation for consulting services and speaker honoraria from Biogen, Sanofi-Genzyme, Merck, Roche, Teva, and Novartis.

Eduardo Agüera has participated in advisory boards for Novartis, Sanofi-Genzyme, Roche, y Biogen, and had received speaking honoraria from Bayer, Sanofi-Genzyme, Merck-Serono, Novartis, Roche y Biogen.

Lucienne Costa-Frossard has received speaking honoraria, consulting services, clinical research, mobility allowance from de Merck, Bayer, Biogen, Novartis, Sanofi-Genzyme, Almirall, Roche, Celgene, Biopas, Ipsen y Teva

Andrés Labiano has received speaking honoraria from Biogen Idec, Novartis, Roche, Genzyme y Merck

José Meca-Lallana has received financial compensation for having participated as advisor and/or speaker for the following companies: Actelion, Almirall, Bayer Schering Pharma, Biogen-Idec, Merck-Serono, Sanofi-Genzyme, Roche, Teva Pharmaceutical Industries Ltd.

Ester Moral has received financial compensation for having participated as advisor and/or speaker for the following companies: Actelion, Almirall, Bayer Schering Pharma, Biogen-Idec, Merck-Serono, Sanofi-Genzyme, Roche, Teva Pharmaceutical Industries Ltd.

Irati Zubizarreta has received compensation for speaking honoraria from Teva, Biogen, Merck, Novartis and Genzyme and travel reimbursement from Genzyme, Roche and Merck for national and international meetings. She received the Rio Hortega scholarship from the Instituto de Salud Carlos III (Spain) from 2016 to 2018

Àlex Rovira serves/ed on scientific advisory boards for Novartis, Sanofi-Genzyme, SyntheticMR, Bayer, Roche, Biogen, and OLEA Medical, and has received speaker honoraria from Bayer, Sanofi-Genzyme, Bracco, Merck-Serono, Teva Pharmaceutical Industries Ltd, Novartis, Roche and Biogen.

Francisco Bravo, Victoria Galán, Laura Koren, Lamberto Landete, Adelaida León, Daniel Lourido, Patricia Martín, Maria Dolores Monedero and Luis Requeni declared no conflict of interest.

Medical writing support was provided by María Yuste from Dynamic Science S.L. The final responsibility for the content lies with the authors.

All the meetings, as well as medical writing and editing support of this poster were founded by Novartis Farmacéutica S.A.
• The worldwide prevalence of MS is increasing in the latest decades\(^1\)
  – Recent studies show a prevalence in Spain as high as 80-180 cases per 100,000\(^2\)
• MRI is the most important paraclinical tool available to support the diagnosis and monitoring of MS\(^3\)
• Coordination between Neurology and Neuroradiology departments is essential to ensure that radiological studies are effectively performed and interpreted

To establish a set of organizational recommendations focused on the coordination between neurologists and neuroradiologists to improve MS management in clinical practice
Methods

- A panel of 17 experts (neurologists and neuroradiologists), from eight Spanish academic hospitals participated in the study.
- The Consensus Recommendation Guideline was conducted in four phases:

  **Phase 1**
  - Definition of the scope and methodology of the study

  **Phase 2**
  - Review of the literature on good practices or recommendations in the use of MRI in MS

  **Phase 3**
  - Discussion of drafted recommendations to achieve a consensus between the authors

  **Phase 4**
  - Formalization and validation of the contents in a set of recommendations

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Results

Nine recommendations are provided to improve the coordination between Neurology and Neuroradiology departments.

**Recommendations 1, 2 and 3**
- Create shared protocols for MRI studies (1) and standardize the MRI requests (2) and MRI reports (3)

  - **Diagnostic of suspected MS**
    - To communicate the information that the neuroradiologist and the MRI staff will need to be able to correctly prioritize and plan the MRI examination
  
  - **Monitoring of confirmed MS**
    - To communicate the current clinical situation and clinical signs of disease activity

MRI, magnetic resonance imaging; MS, multiple sclerosis
## Results

### Key information recommended to be included in the MRI request

<table>
<thead>
<tr>
<th>Diagnostic MRI</th>
<th>Routine follow-up MRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Date of clinically isolated syndrome (CIS)</td>
<td>• Clinical situation</td>
</tr>
<tr>
<td>• Clinical signs and their evolution over time</td>
<td>• Clinical signs and/or disease progression over time</td>
</tr>
<tr>
<td>• Investigation of suspected MS</td>
<td>• Reason for MRI examination: suspected relapse, change in treatment, stable patient control, risk of progressive multifocal leuкоencephalopathy</td>
</tr>
<tr>
<td>• Treatment with corticosteroids? (start and end date)</td>
<td>• Phenotype</td>
</tr>
<tr>
<td>• Parts of the CNS to be examined (justification)</td>
<td>• Grade of disability</td>
</tr>
<tr>
<td>• Main comorbidities</td>
<td>• Current treatment (start date)</td>
</tr>
<tr>
<td>• Assessment of renal function (severe kidney failure)</td>
<td>• Parts of the CNS to be examined (justification)</td>
</tr>
<tr>
<td>• Known allergy to contrast agents</td>
<td>• Main comorbidities</td>
</tr>
<tr>
<td>• Particular needs, such as pregnancy or breastfeeding, claustrophobia, presence of devices, degree of autonomy</td>
<td>• Known allergy to contrast agents</td>
</tr>
<tr>
<td>• Clinical priority</td>
<td>• Particular needs, such as pregnancy or breastfeeding, claustrophobia, presence of devices, degree of autonomy</td>
</tr>
</tbody>
</table>

### Examples of templates for radiological reports of MRI examination

#### Diagnostic MRI

- MRI technique: brain and/or spinal MRI (sequence), with and without gadolinium-based contrast agent administration (dose)
- Date of earlier examination used for comparison (if applicable)
- Comparative study with previous MRI to indicate the number of new or enlarged T2 lesions
- MRI findings:
  - Number of T2 lesions and T2-FLAIR
  - Lesions presence:
    - Periventricular: Yes/No
    - Juxtacortical: Yes/No
    - Brainstem: Yes/No
    - Cerebellum: Yes/No
    - Corpus callosum: Yes/No
    - Spinal cord (if examined): Yes/No
  - Number, size, and shape of all lesions and topography of gadolinium enhancing lesions
  - Enhancement in the leptomeningeal compartment (T2-FLAIR)
  - Detection of focal lesions with severe tissue damage (intracranial hypointensity in T1 SE or T2-FLAIR). Progression in number and size
  - Assessment of brain atrophy progression
  - Any incidental or unexpected findings

#### Follow-up MRI

- MRI technique: brain and/or spinal MRI (sequence), with and without gadolinium-based contrast agent administration (dose)
- Comparative study with previous MRI:
  - Date of earlier examination
  - Indicate if comparison is technically possible
  - Number of T2 lesions
  - Number and topography of new or enlarged T2 lesions
  - Number and topography of gadolinium enhancing lesions
  - Enhancement in the leptomeningeal compartment (T2-FLAIR)
  - Detection of focal lesions with severe tissue damage (intracranial hypointensity in T1 SE or T2-FLAIR). Progression in number and size
  - Assessment of brain atrophy progression
  - Any incidental or unexpected findings
Results

Recommendation 4

- Standardized quantification of the number of demyelinating lesions

<table>
<thead>
<tr>
<th>Number of lesions (range)</th>
<th>Brain MRI</th>
<th>Spinal cord MRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20 (specify exact number)</td>
<td>&lt; 10 (specify exact number)</td>
<td></td>
</tr>
<tr>
<td>20-50</td>
<td>&gt; 10</td>
<td></td>
</tr>
<tr>
<td>50-100</td>
<td>Diffuse pattern</td>
<td></td>
</tr>
<tr>
<td>&gt; 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Countless / confluent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recommendation 5

- Standardization of MRI schedule
  - Estimated time adjusted according to the type of test and patient
  - Reduce unscheduled scans
  - Prioritize based on urgency
  - Appointment reminders

<table>
<thead>
<tr>
<th>Number of lesions (range)</th>
<th>Type</th>
<th>Recommended acquisition times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain MRI diagnosis</td>
<td>40 min</td>
<td></td>
</tr>
<tr>
<td>Brain MRI follow-up</td>
<td>30 min</td>
<td></td>
</tr>
<tr>
<td>Brain + partial spinal cord MRI diagnosis</td>
<td>40 min + 15 min</td>
<td></td>
</tr>
<tr>
<td>Brain + partial spinal cord MRI follow-up</td>
<td>30 min + 15 min</td>
<td></td>
</tr>
<tr>
<td>Brain + complete spinal cord MRI diagnosis</td>
<td>40 min + 20 min</td>
<td></td>
</tr>
<tr>
<td>Brain + complete spinal cord MRI follow-up</td>
<td>30 min + 20 min</td>
<td></td>
</tr>
</tbody>
</table>

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Results

Recommendations 6 and 7

- Identification of reference neuroradiologists for MS (6) and establish multidisciplinary working committees (7)

Recommendations 8 and 9

- Establish coordination sessions between Neurology and Neuroradiology departments (8) and generate formal communication channels to improve the coordination between professionals from both departments (9)

Recommendations for coordination sessions between departments

- Sessions should be held at least twice every year
- Previous reflection of the topics to be discussed in the sessions
- Document sessions with signed minutes
- Channel management to establish direct communication of those decisions that involve significant changes to the directors of the centre
- Professionals involved in the sessions: neuroradiologists, neurologists and neurological nursing graduates. Radiology technicians and other specialists may also be included depending on the topics covered in the sessions
Conclusions

• Despite the routine use of MRI in the care of patients with suspected or confirmed MS, there is a lack of scientific evidence defining its optimal use\(^1\)

• We propose a series of recommendations expected to serve as a functional guide to implement improvements in the coordination between neurologists and neuroradiologists that will ultimately lead to improve the diagnosis and follow-up of MS patients

Thank you