Date of MRI (MM/DD/YYYY):

## T2 lesions analysis

1. Total volume of brain lesions on T2W image (cc):
2. Total T2 lesion counts:

Done

Not Done

* 1. Total number of T2 lesions:

1. Regional T2 lesion counts:

Done

Not Done

* 1. Regional T2 lesion counts:
     1. Number of periventricular lesions:
     2. Number of juxtacortical lesions:
     3. Number of posterior fossa lesions:
     4. Number of cortical lesions:
     5. Number of thalamus lesions:
     6. Number of basal ganglia lesions:
     7. Number of other lesions whose type is not specified\*\*\*:

1. Technique Used:

Manual tracing

Semi-automated (verified by experienced reader)

Fully automated segmentation (verified by experienced reader)

Other, specify:

1. Image pulse sequence used (Choose all that apply):

FLAIR

PD/T2W FSE

T2W SE

Other, specify:

1. Slice thickness (mm):
2. In slice resolution (mm):
3. Gap (mm):
4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## Gd-enhancing lesions analysis

1. Total number of Gd-enhancing lesions:
2. Total volume of Gd-enhancing lesions (cc):
3. Technique Used:

T1-weighted spin echo with contrast

T1-weighted 3D gradient-echo with contrast

Other, specify:

1. Image pulse sequence used:
2. Slice thickness (mm):
3. In slice resolution (mm):
4. Gap (mm):
5. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## T1 hypointense lesions analysis

1. Total number of T1 hypointense lesions:
2. Total volume of T1 hypointense lesions (mL):
3. Technique Used:

Visual determination by experienced reader

Semi-automated (calculated through software, verified by experienced reader)

Fully automated segmentation and counting

Other, specify

1. Image pulse sequence used:

T1-weighted spin echo with contrast

T1-weighted spin echo without contrast

Other, specify:

1. Slice thickness (mm):
2. In slice resolution (mm):
3. Gap (mm):
4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## Brain volume analysis – answer question 1 or 2 (and the corresponding sub-questions), not both

1. Brain volume

Not answered

* 1. Brain volume (mL):
  2. Technique Used:

Automated

Semi-automated

Manual

* 1. Image pulse sequence used:

Dual echo PD/T2W SE

FLAIR

PD SE

T2W SE

T1W SE

T1W 3D gradient-echo

Other, specify:

* 1. Slice thickness (mm):
  2. In slice resolution (mm):
  3. Gap (mm):
  4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

1. Brain volume fraction
   1. Ventricular volume fraction:

Not answered

* 1. Brain volume fraction:

Automated

Semi-automated

Manual

* 1. Image pulse sequence used:

Dual echo PD/T2W SE

FLAIR

PD SE

T2W SE

T1W SE

T1W 3D gradient-echo

Other, specify:

* 1. Slice thickness (mm):
  2. In slice resolution (mm):
  3. Gap (mm):
  4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## Ventricular volume analysis answer question 1 or 2 (and the corresponding sub-questions), but not both

1. Ventricular volume

Not answered

* 1. Ventricular volume (mL):
  2. Technique Used:

Automated

Semi-automated

Manual

* 1. Image pulse sequence used:

Dual echo PD/T2W SE

FLAIR

PD SE

T2W SE

T1W SE

T1W 3D gradient-echo

Other, specify:

* 1. Slice thickness (mm):
  2. In slice resolution (mm):
  3. Gap (mm):
  4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

1. Ventricular volume fraction
   1. Ventricular volume fraction:

Not answered

* 1. Technique Used:

Automated

Semi-automated

Manual

* 1. Image pulse sequence used:

Dual echo PD/T2W SE

FLAIR

PD SE

T2W SE

T1W SE

T1W 3D gradient-echo

Other, specify:

* 1. Slice thickness (mm):
  2. In slice resolution (mm):
  3. Gap (mm):
  4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## Gray matter volume analysis – answer question 1 or 2, but not both, then proceed to question 3

1. Gray matter volume\*\*\*

Not answered

1. Gray matter volume fraction\*\*\*:

Not answered

1. Image pulse sequence used:

Absolute gray matter volume (non-normalized)

Absolute gray matter volume (normalized)

Gray matter fraction

Other, specify:

1. Image pulse sequence used\*\*\*:

Dual echo PD/T2W SE

FLAIR

PD SE

T2W SE

T1W SE

T1W 3D gradient-echo

Other, specify\*\*\*:

1. Slice thickness (mm):
2. In slice resolution (mm):
3. Gap (mm):
4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## Gray matter lesions analysis

1. Total number of gray matter lesions:
2. Total volume of gray matter lesions (mL):
3. Technique Used:

Visual determination by experienced reader

Semi-automated (calculated through software, verified by experienced reader)

Fully automated segmentation, localization, and counting

Other, specify:

1. Image pulse sequence used:

FLAIR

T1W 3D gradient-echo

DIR

PSIR

Other, specify:

1. Slice thickness (mm):
2. In slice resolution (mm):
3. Gap (mm):
4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## White matter volume analysis – answer question 1 or 2, but not both, then proceed to question 3

1. White matter volume (mL)\*\*\*:
2. White matter volume fraction\*\*\*:
3. White matter volume OR White matter volume fraction
   1. Technique Used:

Absolute white matter volume (non-normalized)

Absolute white matter volume (normalized)

White matter fraction

Other, specify

* 1. Image pulse sequence used:

Dual echo PD/T2W SE

FLAIR

PD SE

T2W SE

T1W SE

T1W 3D gradient-echo

Other, specify:

* 1. Slice thickness (mm):
  2. In slice resolution (mm):
  3. Gap (mm):
  4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## Regional brain volumetric analysis

1. Central cerebral volume (mL):
2. Cortical thickness (mm)
3. Brain structure volumes
   1. Hippocampus (mL):
   2. Thalamus (mL):

## ***Other regional volumetric analyses*** (complete as many times as needed):

1. Technique Used\*\*\*:

Central cerebral volume

Cortical thickness

Brain structure volume

* 1. If Brain structure volume, specify structure\*\*\*:

Hippocampus

Thalamus

Lobes

Other, specify\*\*\*:

1. Image pulse sequence used:

Dual echo PD/T2W SE

FLAIR

PD SE

T2W SE

T1W SE

T1W 3D gradient-echo

Other, specify:

1. Slice thickness (mm):
2. In slice resolution (mm):
3. Gap (mm)\*\*\*:
4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## Spinal cord lesions analysis

1. Total number of spinal cord lesions\*\*\*:
2. Spinal cord lesion region (choose all that apply)\*\*\*:

C1-C7

T1-T12

L1-L5

1. Spinal cord lesions location (choose all that apply)\*\*\*:

Anterior

Posterior

Lateral

1. Spinal cord measurement\*\*\*:

Area (mm2):

Volume (mL):

1. Technique Used\*\*\*:

Visual determination by experienced reader

Semi-automated (calculated through software, verified by experienced reader)

Fully automated segmentation, localization and counting

Other, specify\*\*\*:

1. Image pulse sequence used:

T2-weighted (T2)

Proton-density weighted (PD)

Short tau inversion recovery (STIR)

Other, specify\*\*\*:

1. Slice thickness (mm)\*\*\*:
2. In slice resolution (mm):
3. Gap (mm):
4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## Spinal cord volume/cross-sectional area

1. Technique Used\*\*\*:

Manual tracing by experienced reader

Semi-automated (calculated through software, verified by experienced reader)

Losseff – 3mm x 5 axial slices from C2-3 up

Fully automated segmentation

Other, specify\*\*\*:

1. Image pulse sequence used:

T2-weighted (T2)

Proton-density weighted (PD)

Short tau inversion recovery (STIR)

T1W SE

T1W 3D gradient-echo

Other, specify:

1. Slice thickness (mm)\*\*\*:
2. In slice resolution (mm):
3. Gap (mm):
4. Technique reference (i.e., literature citation(s), MRI Acquisition Manual or Analysis Manual):

## Tissue Integrity Measures

1. Techniques Applied, Parameters, Measurement Regions (indicate all that apply to this study):

Table 1: Tissue Integrity Measures

| Technique Type | Done? | Sequence Type | Slice Thickness | Technique Reference | Whole Brain | Normal Appearing WM | Normal Appearing GM | Other Regional Measurements |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MTR | Yes  No |  |  |  | Yes  No | Yes  No | Yes  No | Yes  No |
| DTI | Yes  No |  |  |  | Yes  No | Yes  No | Yes  No | Yes  No |
| Spectroscopy | Yes  No |  |  |  | Yes  No | Yes  No | Yes  No | Yes  No |
| Other | Yes  No |  |  |  | Yes  No | Yes  No | Yes  No | Yes  No |
| Other | Yes  No |  |  |  | Yes  No | Yes  No | Yes  No | Yes  No |
| Other | Yes  No |  |  |  | Yes  No | Yes  No | Yes  No | Yes  No |

## Tissue Integrity Measures

Table 2: MTR – specify units and values

|  | Units | Whole brain | Normal-appearing GM | Normal-appearing WM |
| --- | --- | --- | --- | --- |
| Mean MTR |  |  |  |  |
| MTR histogram peak position |  |  |  |  |
| MTR histogram peak height |  |  |  |  |

Table 3: DTI – specify units and values

|  | Units | Whole brain | Normal-appearing GM | Normal-appearing WM |
| --- | --- | --- | --- | --- |
| Mean FA |  |  |  |  |
| Mean ADC |  |  |  |  |
| Mean axial diffusivity |  |  |  |  |
| Mean radial diffusivity |  |  |  |  |

## General Instructions

This CRF Module is designed to be used in conjunction with the MRI and Imaging Analysis Results – Follow-Up CRF Modules.

Investigators should support use of the MS Imaging CRF Modules with detailed procedure, such as may be contained in the SOPs of their individual intuitions, with particular attention to software versions.

All elements on this CRF are classified as Supplemental unless otherwise indicated by an asterisk (\*) and should be collected if the research team considers them appropriate for their study.

\*\*\*These elements are considered Exploratory.

## Specific Instructions

*Please see the Data Dictionary for definitions for each of the data elements included in this CRF Module.*