

# Tutorial: MSLesionSimulator

1. A simple Multiple Sclerosis (MS) brain lesion load on a structural T1 weighted MRI image.

# Dataset

In this tutorial you will need:

1. A T1 weighted image from a healthy subject.  
The sample used in this tutorial come from the MNI152 template image.
  - a. Any T1w image can be used, e.g. publicly provided MRI images such as in the [IXI dataset](#).

Although the **MSLesionSimulator** toolkit accepts many other imaging modalities (e.g. T2, DTI-FA, or Proton Density MRI images), the minimum required data to simulate MS brain lesion is the T1w image.

# Parameters:

1. Load and select the T1w image

1

3DSlicer

Input Parameters

T1 Volume **Select a Volume**

T2 Volume None

T2-FLAIR Volume None

PD Volume None

DTI-FA Map None

DTI-ADC Map None

Output Lesion Label Select a LabelMapVolume

Return output data in the original space

Is brain extracted?

Apply

MS Lesion Simulation Parameters

Lesion Load 10.00

Sigma 1.00

Lesion Homogeneity 0.50

Lesion Variability 0.50

MS Longitudinal Lesion Simulation Parameters

Simulate Longitudinal Exams?

Follow-ups 2.00

Changing Contrast Balance 56

Output Follow-Up /home

Advanced Parameters


Data Probe

# Parameters:

1. Load and select the T1w image
2. Select the lesion load

3DSlicer

▼ Input Parameters

1 T1 Volume  Select a Volume

T2 Volume None

T2-FLAIR Volume None

PD Volume None

DTI-FA Map None

DTI-ADC Map None


Output Lesion Label Select a LabelMapVolume

Return output data in the original space

Is brain extracted?

Apply

▼ MS Lesion Simulation Parameters

2 Lesion Load  10.00

Sigma 1.00

Lesion Homogeneity 0.50


Lesion Variability 0.50

▼ MS Longitudinal Lesion Simulation Parameters

Simulate Longitudinal Exams?

Follow-ups 2.00

Changing Contrast Balance 56

Output Follow-Up  /home

► Advanced Parameters

► Data Probe

# Parameters:

1. Load and select the T1w image
2. Select the lesion load
3. Press Apply button to run the simulation process

3DSlicer

1

Input Parameters

T1 Volume Select a Volume

T2 Volume None

T2-FLAIR Volume None

PD Volume None

DTI-FA Map None

DTI-ADC Map None

Output Lesion Label Select a LabelMapVolume

Return output data in the original space

Is brain extracted?

3

Apply

2

MS Lesion Simulation Parameters

Lesion Load 10.00

Sigma 1.00

Lesion Homogeneity 0.50

Lesion Variability 0.50

MS Longitudinal Lesion Simulation Parameters

Simulate Longitudinal Exams?

Follow-ups 2.00

Changing Contrast Balance 56

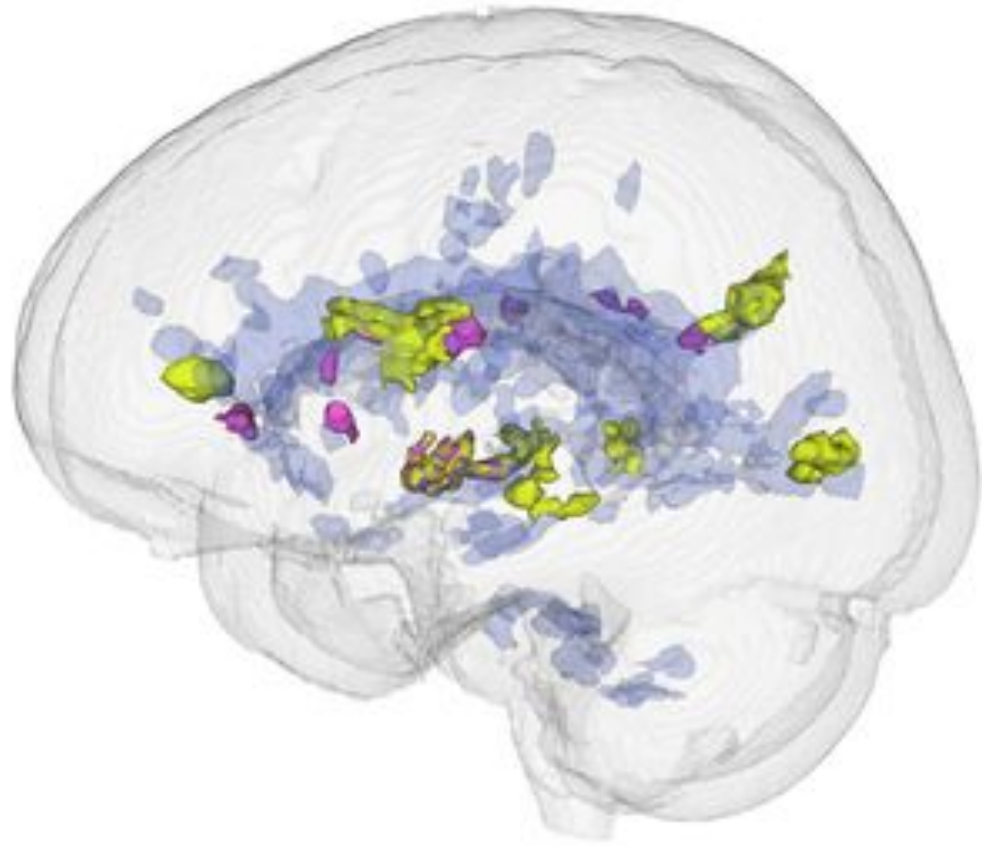
Output Follow-Up /home

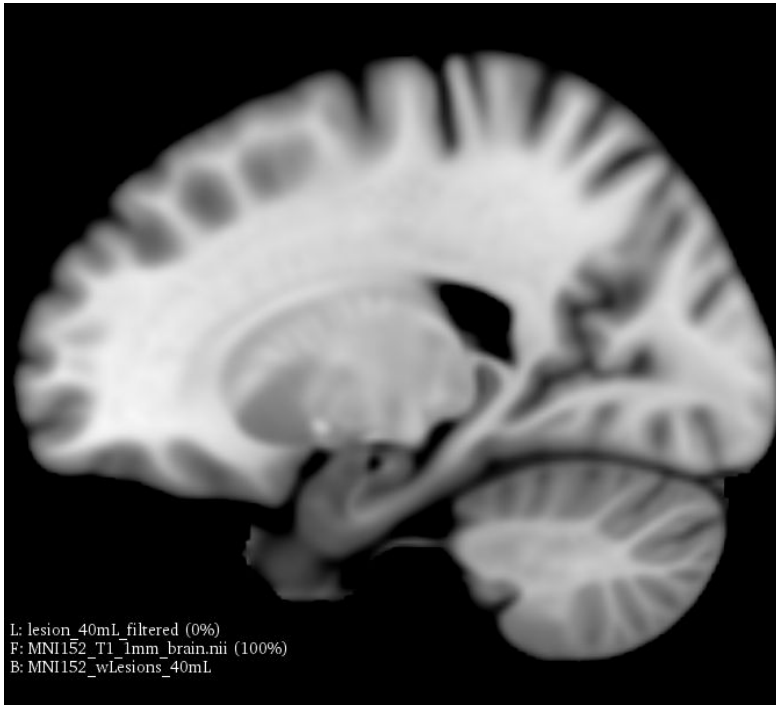
Advanced Parameters

Data Probe

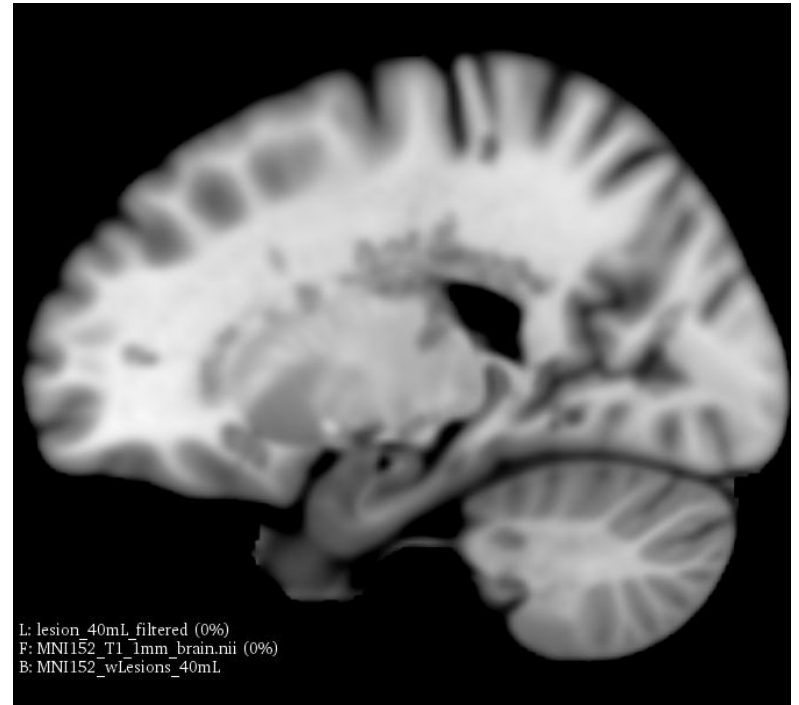
# Results

With this brain lesion simulation procedure, the input T1w image will be changed to present a similar brain tissue pattern found in MS patients. In this case, a set of hypointense lesions must be found in the brain white matter, such as in the following examples.





Original image without MS brain lesions.



Simulated image with hypointense brain lesions

# Contact

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