

Manual segmentations of white matter hyperintensities from a subset of 7 ADNI subjects scanned three consecutive years, for inter-/intra-observer reliability analyses

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Summary

This dataset contains structural magnetic resonance imaging (MRI)-derived data from 7 randomly selected participants enrolled in the Alzheimer's Disease Neuroimaging Initiative (ADNI) project. These data are binary masks of white matter hyperintensities (WMH), all obtained from 21 MRI scans (acquired at three consecutive study visits spaced 12 months apart). These masks were generated using semi-automatic segmentation (i.e., combined thresholding and manual tracing or manual editing of masks) on Mango Version 4.0, available from <http://ric.uthscsa.edu/mango/>

Methods for obtaining the data

The base image for these segmentations is the original T2-FLAIR sequence acquired at each scanning session and downloadable from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database (adni.loni.usc.edu).

WMH object maps were created semi-automatically by thresholding the FLAIR images using the region-growing algorithm in Mango Version 4.0, available from <http://ric.uthscsa.edu/mango/>. Figure 1 shows an example of the windows generated by this software (i.e. Mango) during/for the segmentation process and indicates the functionality of the relevant buttons from the menu in the main window. WMH total volumes (in mm^3) of these segmentations were obtained by multiplying the volume of the WMH in the number of voxels by voxel size (i.e., voxel width by voxel height by voxel depth). The volume of the WMH in the number of voxels was available from the statistical summary feature of Mango Version 4.0 (<http://rii.uthscsa.edu/mango/>), under the column "Sum" (Figure 2). The voxel dimensions were obtained from the "Image Info" option under the "File" dropdown menu in Mango (Figure 3). The output of the segmentation is in nifti.gz format.

To calculate intra-observer reliability, segmentation of the 21 masks was repeated blind to the previous segmentation and cognitive status of participants, resulting in 42 WMH masks. Each brain scan was processed independently, blind to any clinical, cognitive or demographic information and to the results of the WMH segmentations from the same individual at different time points.

Note: The MRI data from which these data were derived were obtained in Analyze 7.5 format from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database (adni.loni.usc.edu). The ADNI was launched in 2003 as a public-private partnership, led by Principal Investigator Michael W. Weiner, MD.

The primary goal of ADNI has been to test whether serial magnetic resonance imaging (MRI), positron emission tomography (PET), other biological markers, and clinical and neuropsychological assessment can be combined to measure the progression of mild cognitive impairment (MCI) and early Alzheimer's disease (AD).

As such, the investigators within the ADNI contributed to the design and implementation of ADNI and/or provided MRI data but did not participate in generating the content of this collection. A complete listing of ADNI investigators can be found at:

http://adni.loni.usc.edu/wp-content/uploads/how_to_apply/ADNI_Acknowledgement_List.pdf

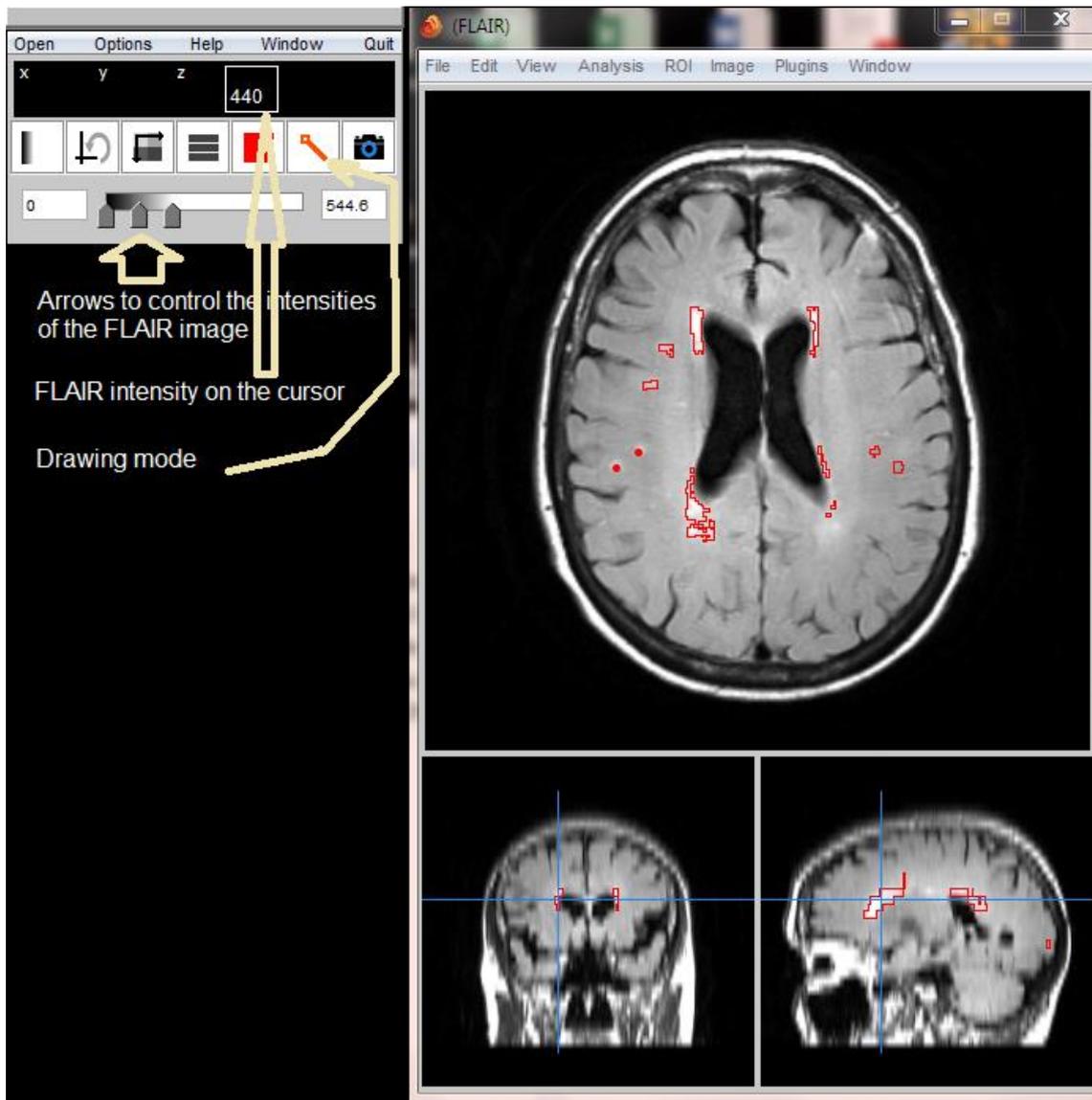


Figure 1. Example of WMH segmentation on a FLAIR image and relevant screens, panels and information in Mango.

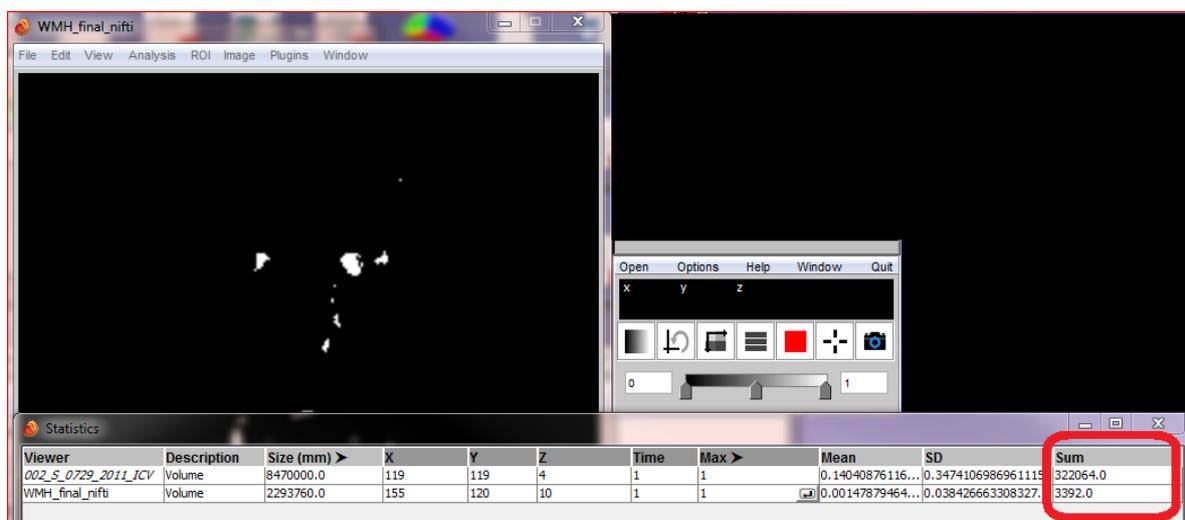


Figure 2. Screenshot of the statistical summary of the WMH region of interest (ROI) highlighting the column that refers to the number of voxels in the segmented ROI.

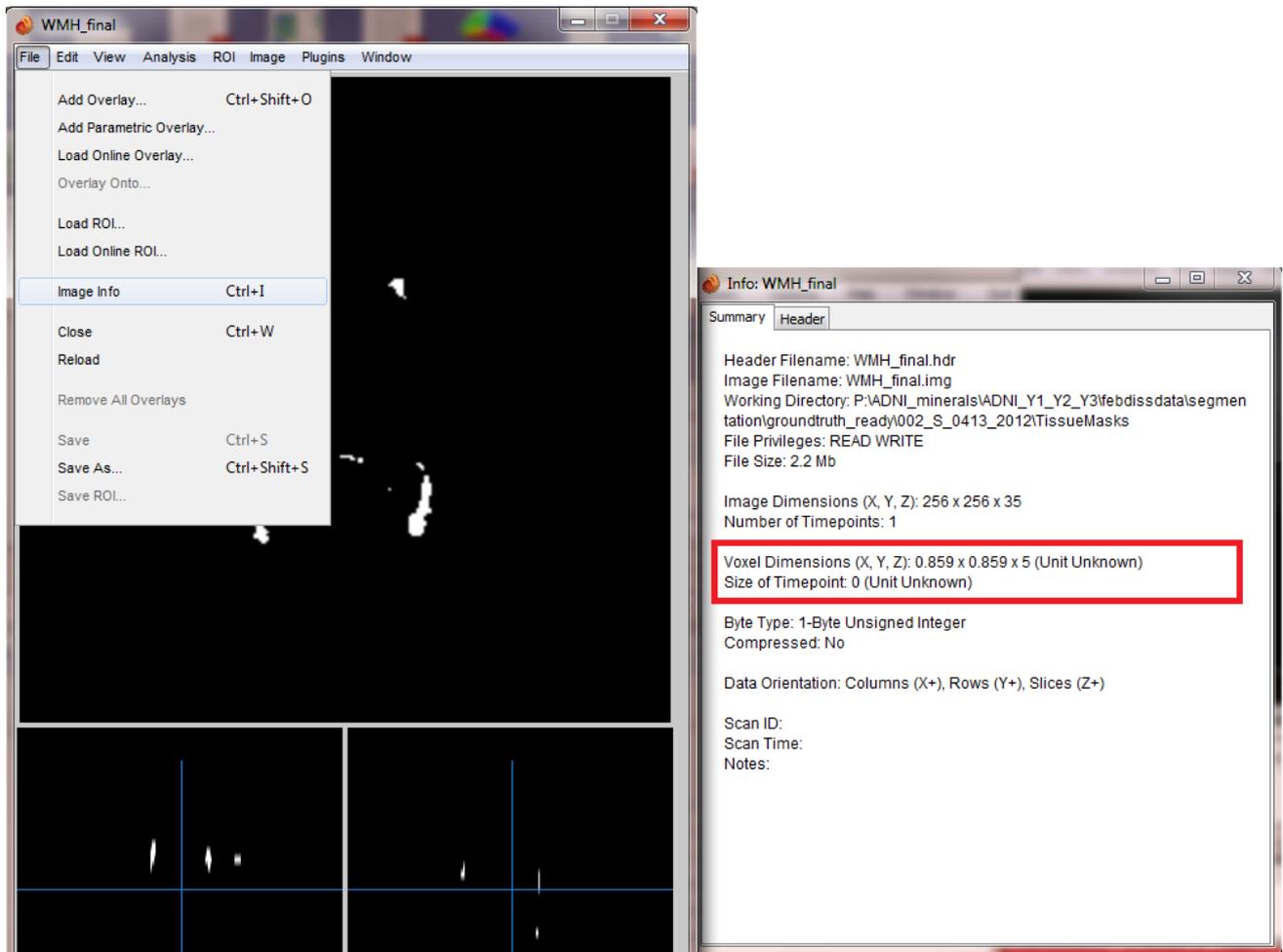


Figure 3. Screenshot of the windows that relate to the process of determining the voxel dimensions: “Image Info” of the submenu under the option “File” from the main menu of the software window that shows the image volume.

Data structure

Each file’s name has the following format:

ADNI contributor centre identification (ID) number – S – Patient’s ID number –original MRI modality -- Date the scan was acquired – Internal ADNI code – roi number (1 or 2) -- image format

For example:

ADNI_098_S_2079_MR_Axial_T2-FLAIR_br_raw_20120927112553880_19_S168924_I336995_roi.nii.gz

means:

ADNI contributor centre 98, patient ID number 2079, mask obtained directly from the raw MR_Axial_T2-FLAIR image obtained on the 27th of September 2012, coded 112553880_19_S168924_I336995 and it is the first WMH roi (out from the two) obtained, in nifti-gzip format.

Intra-observer reliability results

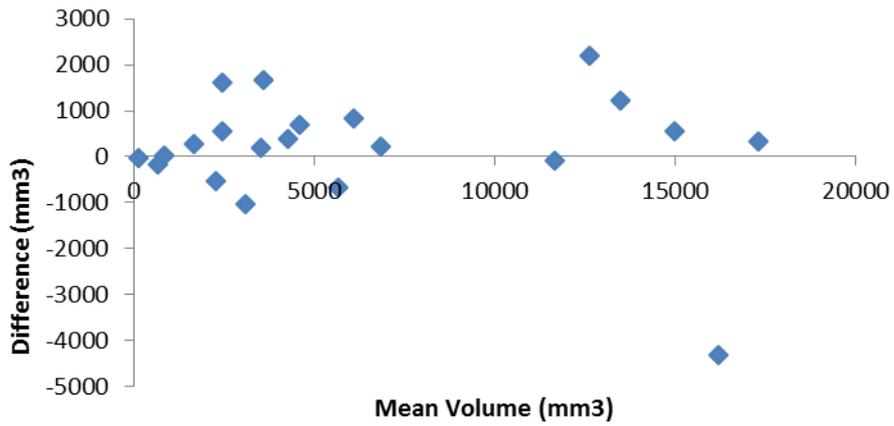


Figure 4. Bland-Altman plot of the mean difference between the two measurements for each of the 21 WMH masks generated (7 subjects scanned 3 consecutive years).

Table 1. Bland-Altman analysis. Numerical results

Subject ID_ Scan Year	WMH1 (Total Vol mm ³)	WMH2 (Total Vol mm ³)	Mean volume (mm ³)	Volume Difference (mm ³)
002_S_0413_2012	11640.07278	11724.92909	11682.50093	-84.856315
002_S_0413_2013	14038.18603	18358.47928	16198.33265	-4320.29326
002_S_0413_2014	13731.96541	11540.45884	12636.21213	2191.50657
009_S_0751_2012	15266.75789	14698.58952	14982.67371	568.16837
009_S_0751_2013	17473.02208	17148.35444	17310.68826	324.66764
009_S_0751_2014	14115.66353	12894.47048	13505.067	1221.193055
018_S_2133_2012	4412.52838	2752.29613	3582.412255	1660.23225
018_S_2133_2013	4460.490645	4069.413715	4264.95218	391.07693
018_S_2133_2014	2571.515285	3615.6169	3093.566093	-1044.10162
031_S_4005_2012	5316.432605	5987.904315	5652.16846	-671.47171
031_S_4005_2013	6504.421015	5666.92608	6085.673548	837.494935
031_S_4005_2014	6965.59664	6733.164125	6849.380383	232.432515
035_S_2061_2012	121.750365	154.95501	138.3526875	-33.204645
035_S_2061_2013	597.68361	763.706835	680.6952225	-166.023225
035_S_2061_2014	874.388985	848.56315	861.4760675	25.825835
035_S_2074_2012	1992.2787	2530.93183	2261.605265	-538.65313
035_S_2074_2013	1804.119045	1520.03486	1662.076953	284.084185
035_S_2074_2014	2719.091485	2150.923115	2435.0073	568.16837
098_S_2079_2012	4958.56032	4264.95218	4611.75625	693.60814
098_S_2079_2013	3608.23809	3412.699625	3510.468858	195.538465
098_S_2079_2014	3272.502235	1663.921655	2468.211945	1608.58058
			Mean Diff	187.8082831
			SD	1297.86897