**MESA Exam 6 Ancillary Study 253 Data Set Variable Guide**

Brain MRI – Perivascular Spaces

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| --- | --- |
| **Data Set name :** | MESAe6as253\_BMRIPVS\_20240108 |
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**MESA Ancillary study #253, Atrial Fibrillation Study**

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See ancillary study publications1-4 in the Reference list below for information on ancillary study methods and for examples of how to analyze the brain MRI data. Please acknowledge the Atrial Fibrillation Ancillary Study funding in all publications that use these brain MRI data, as follows:

“Brain MRI acquisition and analysis was supported by R01 HL127659 from the National Heart, Lung, and Blood Institute with additional support from the National Institute on Aging.”

MESA participants from all six field centers who participated in the Atrial Fibrillation ancillary study3,4 at Exam 6 were invited to complete a 3T brain MRI a median 18 (IQR: 16, 20) months after the Exam 6 visit. This data set contains one record per ancillary study participant (n=1062) who completed a brain MRI in March 2018 through August 2019 as part of the Atrial Fibrillation ancillary study.

Drs. Tanweer Rashid and Mohamad Habes at the University of Texas Health Science Center San Antonio provided this Perivascular Spaces (PVS) dataset of PVS counts and volumes. PVS are also referred to as “enlarged PVS” or ePVS. PVS were segmented and quantified using a deep learning method taking co-registered T1w, T2w, and FLAIR MRI data as input as described in a previous report5. The brain was parcellated into a number of regions-of-interest (ROI), similar to the mapping previously described5. All PVS volumes are expressed in microliters (µl).

PVS QC codes:

The variable pvs\_qc\_code contains information on quality control issues. The values and their explanations are as follows:

0 Scan quality is good

1 Scan can be used but with caution

2 Scan has too much distortion or artifact to be useful

Exclusions:

Of the 1062 participants with brain MRI, 3 have no PVS data. Ten scans had too much distortion or artifact to be useful for PVS (pvs\_qc\_code = 2) and must also be excluded. All PVS variables have been set to missing for those 3 + 10 = 13 participants. Analysts should examine in a sensitivity analysis whether results are sensitive to inclusion or exclusion of the 19 participants with pvs\_qc\_code=1 (“scan can be used but with caution”).

Recommended adjustments: All brain MRI analyses in MESA should be adjusted for field center.

Abbreviations:

wm white matter

**References**

1. Charisis S, Rashid T, Liu H, Ware JB, Jensen PN, Austin TR, Li K, Fadaee E, Hilal S, Chen C, et al. Assessment of Risk Factors and Clinical Importance of Enlarged Perivascular Spaces by Whole-Brain Investigation in the Multi-Ethnic Study of Atherosclerosis. *JAMA Netw Open*. 2023;6:e239196. doi: 10.1001/jamanetworkopen.2023.9196

2. Austin TR, Nasrallah IM, Erus G, Desiderio LM, Chen LY, Greenland P, Harding BN, Hughes TM, Jensen PN, Longstreth WT, Jr., et al. Association of Brain Volumes and White Matter Injury With Race, Ethnicity, and Cardiovascular Risk Factors: The Multi-Ethnic Study of Atherosclerosis. *Journal of the American Heart Association*. 2022;11:e023159. doi: 10.1161/JAHA.121.023159

3. Heckbert SR, Austin TR, Jensen PN, Floyd JS, Psaty BM, Soliman EZ, Kronmal RA. Yield and consistency of arrhythmia detection with patch electrocardiographic monitoring: The Multi-Ethnic Study of Atherosclerosis. *J Electrocardiol*. 2018;51:997-1002.

4. Heckbert SR, Austin TR, Jensen PN, Chen LY, Post WS, Floyd JS, Soliman EZ, Kronmal RA, Psaty BM. Differences by race/ethnicity in the prevalence of clinically detected and monitor-detected atrial fibrillation: MESA. *Circulation Arrhythmia and electrophysiology*. 2020;13:e007698. doi: 10.1161/CIRCEP.119.007698

5. Rashid T, Liu H, Ware JB, Li K, Romero JR, Fadaee E, Nasrallah IM, Hilal S, Bryan RN, Hughes TM, et al. Deep learning based detection of enlarged perivascular spaces on brain MRI. *Neuroimage Reports*. 2023;3:100162.

| **Order** | **Variable** | **Variable Description** |
| --- | --- | --- |
| 1 | idno | MESA Participant ID |
| 2 | agebrainmri6c | Age at exam 6 brain MRI |
| 3 | brainmri\_tt6c | Time from baseline to exam 6 brain MRI (days) |
| 4 | pvs\_qc\_code | QC code for PVS |
| 5 | pvs\_exclude | 0 = Include in analysis of PVS  1 = Exclude from analysis of PVS based on QC Code |
| 6 | epvs\_wholebrain\_n | EPVS\_Wholebrain\_No\_of\_Lesions |
| 7 | epvs\_wholebrain\_vol | EPVS\_Wholebrain\_Volume\_of\_Lesions |
| 8 | epvs\_basalganglia\_n | EPVS\_BasalGanglia\_No\_of\_Lesions |
| 9 | epvs\_basalganglia\_vol | EPVS\_BasalGanglia\_Volume\_of\_Lesions |
| 10 | epvs\_frontoparietal\_n | EPVS\_Frontoparietal\_Region\_No\_of\_Lesions |
| 11 | epvs\_frontoparietal\_vol | EPVS\_Frontoparietal\_Region\_Volume\_of\_Lesions |
| 12 | epvs\_hippocampus\_temporalwm\_n | EPVS\_Hippocampus\_TemporalWM\_No\_of\_Lesions |
| 13 | epvs\_hippocampus\_temporalwm\_vol | EPVS\_Hippocampus\_TemporalWM\_Volume\_of\_Lesions |
| 14 | epvs\_insula\_n | EPVS\_Insula\_No\_of\_Lesions |
| 15 | epvs\_insula\_vol | EPVS\_Insula\_Volume\_of\_Lesions |
| 16 | epvs\_brainstem\_n | EPVS\_Brainstem\_No\_of\_Lesions |
| 17 | epvs\_brainstem\_vol | EPVS\_Brainstem\_Volume\_of\_Lesions |
| 18 | epvs\_thalamus\_n | EPVS\_Thalamus\_No\_of\_Lesions |
| 19 | epvs\_thalamus\_vol | EPVS\_Thalamus\_Volume\_of\_Lesions |
| 20 | epvs\_occipital\_n | EPVS\_Occipital\_No\_of\_Lesions |
| 21 | epvs\_occipital\_vol | EPVS\_Occipital\_Volume\_of\_Lesions |
| 22 | epvs\_cerebellum\_n | EPVS\_Cerebellum\_No\_of\_Lesions |
| 23 | epvs\_cerebellum\_vol | EPVS\_Cerebellum\_Volume\_of\_Lesions |