



The BIOCARD Study

Biomarkers of Cognitive Decline
Among Normal Individuals

**MRI Data – FreeSurfer:
Longitudinal Cortical Thickness
Limited Dataset
May 2020**

Glossary of Terms

Term	Description
Allowable Codes	codes (and their meanings) allowed to be values for that variable
Audit Findings	error rates based on BIOCARD or NIH phase audits error rates are calculated as number of errors / total number of variables examined
Baseline visit	date admitted to NIH phase of BIOCARD study <i>[Note: some data may have been collected prior to this date]</i>
Collection	when the variable information was collected (i.e., Baseline, Follow-up)
Comments	further information about the variable not covered in the above fields
Data Type	numeric or character <i>[Note: Dates are numeric data]</i> numeric or character classifications are strictly related to how the data are stored and not how the data should be analyzed
JHU phase	the study phase at JHU from 2009 - present
Missing OK If	instances (such as skips) or reasons why a blank or missing value is acceptable
NA	not applicable for this variable
NIH / NIH phase	the study phase that was performed at the NIH from 1995-2005
Question Text	the question as it appears on the NACC or BIOCARD data collection forms
Short Description	a short explanation of what the variable means
Source	the name of the NACC form, BIOCARD form, or NIH dataset containing the variable information (or "DERIVED" if the variable was derived) and the variable question number located on the form or in the dataset, if applicable
Unknown Code	the codes for the "unknown", "don't know", or missing values for the variable
Variable Name	the name of the variable in the provided dataset <i>[Note: Variables will follow the NACC naming scheme as closely as possible]</i>

Acronyms and Definitions

AD	Alzheimer's Disease	JHU	The Johns Hopkins University
CDR	Clinical Dementia Rating	MCI	Mild Cognitive Impairment
CERAD	Consortium to Establish a Registry for Alzheimer's Disease	MMSE	Mini-Mental State Examination
CNS	Central Nervous System	NACC	National Alzheimer's Coordinating Center
CSF	Cerebrospinal Fluid	NIA	National Institute on Aging
CVD	Cardiovascular Disease	NINDS	National Institute of Neurological Disorders and Stroke
CVLT	California Verbal Learning Test	NPI-Q	Neuropsychiatric Inventory Questionnaire
FAQ	Functional Assessment Questionnaire	UPDRS	Unified Parkinson's Disease Rating Scale
FTD	Frontotemporal Degenerations	WAIS	Wechsler Adult Intelligence Scale
GDS	Geriatric Depression Scale	WMS	Wechsler Memory Scale

FREE SURFER MRI Data Limited Dataset Characteristics

Number of variables: 74

Order of variables:

1) JHUANONID	<i>Participant ID Anonymized by JHU</i>
2) VISITNO	<i>MRI visit number</i>
3) MRIMOBL	<i>Months from baseline</i>
4) MISSINGNESS	<i>Indicator variable; 1 if scan includes at least one missing region due to unreliable FreeSurfer labeling (e.g., regions of overestimation or underestimation; inconsistency with structural boundaries) or poor scan quality (e.g., poor contrast; movement artifact; global failure of FreeSurfer pipeline)</i>
5) LH_BANKSSTS_THICKNESS	<i>Left hemisphere banks of the superior temporal sulcus thickness</i>
6) LH_CAUDALANTERIORCINGULATE_THICKNESS	<i>Left hemisphere caudal anterior cingulate thickness</i>
7) LH_CAUDALMIDDLEFRONTAL_THICKNESS	<i>Left hemisphere caudal middle frontal thickness</i>
8) LH_CUNEUS_THICKNESS	<i>Left hemisphere cuneus thickness</i>
9) LH_ENTORHINAL_THICKNESS	<i>Left hemisphere entorhinal thickness</i>
10) LH_FUSIFORM_THICKNESS	<i>Left hemisphere fusiform thickness</i>
11) LH_INFERIORPARIETAL_THICKNESS	<i>Left hemisphere inferior parietal thickness</i>
12) LH_INFERIORTEMPORAL_THICKNESS	<i>Left hemisphere inferior temporal thickness</i>
13) LH_ISTHMUSCINGULATE_THICKNESS	<i>Left hemisphere isthmus cingulate thickness</i>
14) LH_LATERALOCIPITAL_THICKNESS	<i>Left hemisphere lateral occipital thickness</i>
15) LH_LATERALORBITOFRONTAL_THICKNESS	<i>Left hemisphere lateral orbitofrontal thickness</i>
16) LH_LINGUAL_THICKNESS	<i>Left hemisphere lingual thickness</i>
17) LH_MEDIALORBITOFRONTAL_THICKNESS	<i>Left hemisphere medial orbitofrontal thickness</i>
18) LH_MIDDLETEMPORAL_THICKNESS	<i>Left hemisphere middle temporal thickness</i>
19) LH_PARAHIPPOCAMPAL_THICKNESS	<i>Left hemisphere parahippocampal thickness</i>
20) LH_PARACENTRAL_THICKNESS	<i>Left hemisphere paracentral thickness</i>
21) LH_PARSOPERCULARIS_THICKNESS	<i>Left hemisphere pars opercularis thickness</i>
22) LH_PARSORBITALIS_THICKNESS	<i>Left hemisphere pars orbitalis thickness</i>
23) LH_PARSTRIANGULARIS_THICKNESS	<i>Left hemisphere pars triangularis thickness</i>
24) LH_PERICALCARINE_THICKNESS	<i>Left hemisphere pericalcarine thickness</i>
25) LH_POSTCENTRAL_THICKNESS	<i>Left hemisphere postcentral thickness</i>
26) LH_POSTERIORCINGULATE_THICKNESS	<i>Left hemisphere posterior cingulate thickness</i>
27) LH_PRECENTRAL_THICKNESS	<i>Left hemisphere precentral thickness</i>

28) LH_PRECUNEUS_THICKNESS	<i>Left hemisphere precuneus thickness</i>
29) LH_ROSTRALANTERIORCINGULATE_THICKNESS	<i>Left hemisphere rostral anterior cingulate thickness</i>
30) LH_ROSTRALMIDDLEFRONTAL_THICKNESS	<i>Left hemisphere rostral middle frontal thickness</i>
31) LH_SUPERIORFRONTAL_THICKNESS	<i>Left hemisphere superior frontal thickness</i>
32) LH_SUPERIORPARIETAL_THICKNESS	<i>Left hemisphere superior parietal thickness</i>
33) LH_SUPERIORTEMPORAL_THICKNESS	<i>Left hemisphere superior temporal thickness</i>
34) LH_SUPRAMARGINAL_THICKNESS	<i>Left hemisphere supramarginal thickness</i>
35) LH_FRONTALPOLE_THICKNESS	<i>Left hemisphere frontal pole thickness</i>
36) LH_TEMPORALPOLE_THICKNESS	<i>Left hemisphere temporal pole thickness</i>
37) LH_TRANSVERSETEMPORAL_THICKNESS	<i>Left hemisphere transverse temporal thickness</i>
38) LH_INSULA_THICKNESS	<i>Left hemisphere insula thickness</i>
39) LH_MEANTHICKNESS_THICKNESS	<i>Left hemisphere mean thickness thickness</i>
40) RH_BANKSSTS_THICKNESS	<i>Right hemisphere banks of the superior temporal sulcus thickness</i>
41) RH_CAUDALANTERIORCINGULATE_THICKNESS	<i>Right hemisphere caudal anterior cingulate thickness</i>
42) RH_CAUDALMIDDLEFRONTAL_THICKNESS	<i>Right hemisphere caudal middle frontal thickness</i>
43) RH_CUNEUS_THICKNESS	<i>Right hemisphere cuneus thickness</i>
44) RH_ENTORHINAL_THICKNESS	<i>Right hemisphere entorhinal thickness</i>
45) RH_FUSIFORM_THICKNESS	<i>Right hemisphere fusiform thickness</i>
46) RH_INFERIORPARIETAL_THICKNESS	<i>Right hemisphere inferior parietal thickness</i>
47) RH_INFERIORTEMPORAL_THICKNESS	<i>Right hemisphere inferior temporal thickness</i>
48) RH_ISTHMUSCINGULATE_THICKNESS	<i>Right hemisphere isthmus cingulate thickness</i>
49) RH_LATERALOCIPITAL_THICKNESS	<i>Right hemisphere lateral occipital thickness</i>
50) RH_LATERALORBITOFRONTAL_THICKNESS	<i>Right hemisphere lateral orbitofrontal thickness</i>
51) RH_LINGUAL_THICKNESS	<i>Right hemisphere lingual thickness</i>
52) RH_MEDIALORBITOFRONTAL_THICKNESS	<i>Right hemisphere medial orbitofrontal thickness</i>
53) RH_MIDDLETEMPORAL_THICKNESS	<i>Right hemisphere middle temporal thickness</i>
54) RH_PARAHIPPOCAMPAL_THICKNESS	<i>Right hemisphere parahippocampal thickness</i>
55) RH_PARACENTRAL_THICKNESS	<i>Right hemisphere paracentral thickness</i>
56) RH_PARSOPERCULARIS_THICKNESS	<i>Right hemisphere pars opercularis thickness</i>
57) RH_PARSORBITALIS_THICKNESS	<i>Right hemisphere pars orbitalis thickness</i>
58) RH_PARSTRIANGULARIS_THICKNESS	<i>Right hemisphere pars triangularis thickness</i>
59) RH_PERICALCARINE_THICKNESS	<i>Right hemisphere pericalcarine thickness</i>

60) RH_POSTCENTRAL_THICKNESS	<i>Right hemisphere postcentral thickness</i>
61) RH_POSTERIORCINGULATE_THICKNESS	<i>Right hemisphere posterior cingulate thickness</i>
62) RH_PRECENTRAL_THICKNESS	<i>Right hemisphere precentral thickness</i>
63) RH_PRECUNEUS_THICKNESS	<i>Right hemisphere precuneus thickness</i>
64) RH_ROSTRALANTERIORCINGULATE_THICKNESS	<i>Right hemisphere rostral anterior cingulate thickness</i>
65) RH_ROSTRALMIDDLEFRONTAL_THICKNESS	<i>Right hemisphere rostral middle frontal thickness</i>
66) RH_SUPERIORFRONTAL_THICKNESS	<i>Right hemisphere superior frontal thickness</i>
67) RH_SUPERIORPARIETAL_THICKNESS	<i>Right hemisphere superior parietal thickness</i>
68) RH_SUPERIORTEMPORAL_THICKNESS	<i>Right hemisphere superior temporal thickness</i>
69) RH_SUPRAMARGINAL_THICKNESS	<i>Right hemisphere supramarginal thickness</i>
70) RH_FRONTALPOLE_THICKNESS	<i>Right hemisphere frontal pole thickness</i>
71) RH_TEMPORALPOLE_THICKNESS	<i>Right hemisphere temporal pole thickness</i>
72) RH_TRANSVERSETEMPORAL_THICKNESS	<i>Right hemisphere transverse temporal thickness</i>
73) RH_INSULA_THICKNESS	<i>Right hemisphere insula thickness</i>
74) RH_MEANTHICKNESS_THICKNESS	<i>Right hemisphere mean thickness thickness</i>

Free Surfer MRI Data

1)	Variable Name	JHUANONID
	Short Description	Participant ID Anonymized by JHU
	Source	NA
	Question Text	NA
	Time of Collection	Baseline
	Data Type	Character
	Allowable Codes	JHU + 6 numbers
	Missing OK If	NA
	Audit Findings	NA
	Comments	None
2)	Variable Name	VISITNO
	Short Description	MRI visit number
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	<p>NIH visit: Integers and decimals from 0 to 10, where a visit 0 represents a visit that occurred prior to the established baseline date</p> <p>JHU visit: 101, 102, 103, 104, 1XX where XX is from 01 to 99</p> <p>Visit number 999 used for all participants that have died before a 101 visit for forms: A4, A5, A5a, B1, B2, B3, B3a, B8, B9, and D1. For participants that are alive, an A5 may have a 999 visit number to capture medical data acquired during the NIH phase of the study.</p>
	Missing OK If	NA
	Audit Findings	No NIH or JHU audit
	Comments	Visit when MRI was completed

3)	Variable Name	MRIMOBL
	Short Description	Months from baseline
	Source	DERIVED
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = 0 Max = 999
	Missing OK If	NA
	Audit Findings	NA
	Comments	Calculated as months between the baseline start date and the recorded MRI date.

4)	Variable Name	MISSINGNESS
	Short Description	Indicator variable; 1 if scan includes at least one missing region due to unreliable FreeSurfer labeling (e.g., regions of overestimation or underestimation; inconsistency with structural boundaries) or poor scan quality (e.g., poor contrast; movement artifact; global failure of FreeSurfer pipeline)
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	None.

- 5) Variable Name **LH_BANKSSTS_THICKNESS**
- Short Description Left hemisphere banks of the superior temporal sulcus thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
- 6) Variable Name **LH_CAUDALANTERIORCINGULATE_THICKNESS**
- Short Description Left hemisphere caudal anterior cingulate thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

- 7) Variable Name **LH_CAUDALMIDDLEFRONTAL_THICKNESS**
- Short Description Left hemisphere caudal middle frontal thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
- 8) Variable Name **LH_CUNEUS_THICKNESS**
- Short Description Left hemisphere cuneus thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

- 9) Variable Name **LH_ENTORHINAL_THICKNESS**
- Short Description Left hemisphere entorhinal thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
 Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
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- 10) Variable Name **LH_FUSIFORM_THICKNESS**
- Short Description Left hemisphere fusiform thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
 Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

11)	Variable Name	LH_INFERIORPARIETAL_THICKNESS
	Short Description	Left hemisphere inferior parietal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
12)	Variable Name	LH_INFERIORETEMPORAL_THICKNESS
	Short Description	Left hemisphere inferior temporal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

- 13) Variable Name** **LH_ISTHMUSCINGULATE_THICKNESS**
- Short Description** Left hemisphere isthmus cingulate thickness
- Source** NA
- Question Text** NA
- Time of Collection** Baseline and Follow-up
- Data Type** Numeric
- Allowable Codes** Min = TBD
Max = TBD
- Missing OK If** NA
- Audit Findings** NA
- Comments** Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
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- 14) Variable Name** **LH_LATERALOCIPITAL_THICKNESS**
- Short Description** Left hemisphere lateral occipital thickness
- Source** NA
- Question Text** NA
- Time of Collection** Baseline and Follow-up
- Data Type** Numeric
- Allowable Codes** Min = TBD
Max = TBD
- Missing OK If** NA
- Audit Findings** NA
- Comments** Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

15)	Variable Name	LH_LATERALORBITOFRONTAL_THICKNESS
	Short Description	Left hemisphere lateral orbitofrontal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
16)	Variable Name	LH_LINGUAL_THICKNESS
	Short Description	Left hemisphere lingual thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

17)	Variable Name	LH_MEDIALORBITOFRONTAL_THICKNESS
	Short Description	Left hemisphere medial orbitofrontal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
18)	Variable Name	LH_MIDDLETEMPORAL_THICKNESS
	Short Description	Left hemisphere middle temporal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

19)	Variable Name	LH_PARAHIPPOCAMPAL_THICKNESS
	Short Description	Left hemisphere parahippocampal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
20)	Variable Name	LH_PARACENTRAL_THICKNESS
	Short Description	Left hemisphere paracentral thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

21)	Variable Name	LH_PARSOPERCULARIS_THICKNESS
	Short Description	Left hemisphere pars opercularis thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
22)	Variable Name	LH_PARSORBITALIS_THICKNESS
	Short Description	Left hemisphere pars orbitalis thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

23)	Variable Name	LH_PARSTRIANGULARIS_THICKNESS
	Short Description	Left hemisphere pars triangularis thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
24)	Variable Name	LH_PERICALCARINE_THICKNESS
	Short Description	Left hemisphere pericalcarine thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

- 25) Variable Name **LH_POSTCENTRAL_THICKNESS**
- Short Description Left hemisphere postcentral thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
 Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
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- 26) Variable Name **LH_POSTERIORCINGULATE_THICKNESS**
- Short Description Left hemisphere posterior cingulate thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
 Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

27)	Variable Name	LH_PRECENTRAL_THICKNESS
	Short Description	Left hemisphere precentral thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
28)	Variable Name	LH_PRECUNEUS_THICKNESS
	Short Description	Left hemisphere precuneus thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

29)	Variable Name	LH_ROSTRALANTERIORCINGULATE_THICKNESS
	Short Description	Left hemisphere rostral anterior cingulate thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
30)	Variable Name	LH_ROSTRALMIDDLEFRONTAL_THICKNESS
	Short Description	Left hemisphere rostral middle frontal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

31)	Variable Name	LH_SUPERIORFRONTAL_THICKNESS
	Short Description	Left hemisphere superior frontal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
32)	Variable Name	LH_SUPERIORPARIETAL_THICKNESS
	Short Description	Left hemisphere superior parietal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

33)	Variable Name	LH_SUPERIORTEMPORAL_THICKNESS
	Short Description	Left hemisphere superior temporal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
34)	Variable Name	LH_SUPRAMARGINAL_THICKNESS
	Short Description	Left hemisphere supramarginal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

35)	Variable Name	LH_FRONTALPOLE_THICKNESS
	Short Description	Left hemisphere frontal pole thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
36)	Variable Name	LH_TEMPORALPOLE_THICKNESS
	Short Description	Left hemisphere temporal pole thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

37)	Variable Name	LH_TRANSVERSETEMPORAL_THICKNESS
	Short Description	Left hemisphere transverse temporal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
38)	Variable Name	LH_INSULA_THICKNESS
	Short Description	Left hemisphere insula thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

39)	Variable Name	LH_MEANTHICKNESS_THICKNESS
	Short Description	Left hemisphere mean thickness thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
40)	Variable Name	RH_BANKSSTS_THICKNESS
	Short Description	Right hemisphere banks of the superior temporal sulcus thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

41)	Variable Name	RH_CAUDALANTERIORCINGULATE_THICKNESS
	Short Description	Right hemisphere caudal anterior cingulate thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
42)	Variable Name	RH_CAUDALMIDDLEFRONTAL_THICKNESS
	Short Description	Right hemisphere caudal middle frontal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

43)	Variable Name	RH_CUNEUS_THICKNESS
	Short Description	Right hemisphere cuneus thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
44)	Variable Name	RH_ENTORHINAL_THICKNESS
	Short Description	Right hemisphere entorhinal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

45)	Variable Name	RH_FUSIFORM_THICKNESS
	Short Description	Right hemisphere fusiform thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
46)	Variable Name	RH_INFERIORPARIETAL_THICKNESS
	Short Description	Right hemisphere inferior parietal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

47)	Variable Name	RH_INFERIORTEMPORAL_THICKNESS
	Short Description	Right hemisphere inferior temporal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
48)	Variable Name	RH_ISTHMUSCINGULATE_THICKNESS
	Short Description	Right hemisphere isthmus cingulate thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

49)	Variable Name	RH_LATERALOCIPITAL_THICKNESS
	Short Description	Right hemisphere lateral occipital thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
50)	Variable Name	RH_LATERALORBITOFRONTAL_THICKNESS
	Short Description	Right hemisphere lateral orbitofrontal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

51)	Variable Name	RH_LINGUAL_THICKNESS
	Short Description	Right hemisphere lingual thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

52)	Variable Name	RH_MEDIALORBITOFRONTAL_THICKNESS
	Short Description	Right hemisphere medial orbitofrontal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

53)	Variable Name	RH_MIDDLETEMPORAL_THICKNESS
	Short Description	Right hemisphere middle temporal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
54)	Variable Name	RH_PARAHIPPOCAMPAL_THICKNESS
	Short Description	Right hemisphere parahippocampal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

55)	Variable Name	RH_PARACENTRAL_THICKNESS
	Short Description	Right hemisphere paracentral thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
56)	Variable Name	RH_PARSOPERCULARIS_THICKNESS
	Short Description	Right hemisphere pars opercularis thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

57)	Variable Name	RH_PARSORBITALIS_THICKNESS
	Short Description	Right hemisphere pars orbitalis thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
58)	Variable Name	RH_PARSTRIANGULARIS_THICKNESS
	Short Description	Right hemisphere pars triangularis thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

59)	Variable Name	RH_PERICALCARINE_THICKNESS
	Short Description	Right hemisphere pericalcarine thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
60)	Variable Name	RH_POSTCENTRAL_THICKNESS
	Short Description	Right hemisphere postcentral thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

61)	Variable Name	RH_POSTERIORCINGULATE_THICKNESS
	Short Description	Right hemisphere posterior cingulate thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
62)	Variable Name	RH_PRECENTRAL_THICKNESS
	Short Description	Right hemisphere precentral thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

- 63)** Variable Name **RH_PRECUNEUS_THICKNESS**
- Short Description Right hemisphere precuneus thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
 Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
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- 64)** Variable Name **RH_ROSTRALANTERIORCINGULATE_THICKNESS**
- Short Description Right hemisphere rostral anterior cingulate thickness
- Source NA
- Question Text NA
- Time of Collection Baseline and Follow-up
- Data Type Numeric
- Allowable Codes Min = TBD
 Max = TBD
- Missing OK If NA
- Audit Findings NA
- Comments Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. *Neurobiology of Aging* 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

65)	Variable Name	RH_ROSTRALMIDDLEFRONTAL_THICKNESS
	Short Description	Right hemisphere rostral middle frontal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
66)	Variable Name	RH_SUPERIORFRONTAL_THICKNESS
	Short Description	Right hemisphere superior frontal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

67)	Variable Name	RH_SUPERIORPARIETAL_THICKNESS
	Short Description	Right hemisphere superior parietal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
68)	Variable Name	RH_SUPERIORTEMPORAL_THICKNESS
	Short Description	Right hemisphere superior temporal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

69)	Variable Name	RH_SUPRAMARGINAL_THICKNESS
	Short Description	Right hemisphere supramarginal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
70)	Variable Name	RH_FRONTALPOLE_THICKNESS
	Short Description	Right hemisphere frontal pole thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. Neurobiology of Aging 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

71)	Variable Name	RH_TEMPORALPOLE_THICKNESS
	Short Description	Right hemisphere temporal pole thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. <i>Neurobiology of Aging</i> 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
72)	Variable Name	RH_TRANSVERSETEMPORAL_THICKNESS
	Short Description	Right hemisphere transverse temporal thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. <i>Neurobiology of Aging</i> 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.

73)	Variable Name	RH_INSULA_THICKNESS
	Short Description	Right hemisphere insula thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. <i>Neurobiology of Aging</i> 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.
74)	Variable Name	RH_MEANTHICKNESS_THICKNESS
	Short Description	Right hemisphere mean thickness thickness
	Source	NA
	Question Text	NA
	Time of Collection	Baseline and Follow-up
	Data Type	Numeric
	Allowable Codes	Min = TBD Max = TBD
	Missing OK If	NA
	Audit Findings	NA
	Comments	Measure obtained using the longitudinal FreeSurfer pipeline, version 5.3. For more information, see: Pettigrew C, Soldan A, Zhu Y, Cai Q, Wang MC, Moghekar A, Miller MI, Singh B, Martinez O, Fletcher E, DeCarli C, Albert M. Cognitive reserve and rate of change in Alzheimer's and cerebrovascular disease biomarkers among cognitively normal individuals. <i>Neurobiology of Aging</i> 2020; in press. doi: 10.1016/j.neurobiolaging.2019.12.003.