



# **The BIOCARD Study**

Biomarkers of Cognitive Decline Among  
Normal Individuals

**MRI Cross Sectional Free Surfer  
Limited Dataset**

## Glossary of Terms

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| 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<br><br>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><br>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

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|       |                                                            |       |                                                         |
|-------|------------------------------------------------------------|-------|---------------------------------------------------------|
| 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                                   |

# MRI Cross-Sectional Free-Surfer Data Limited Dataset Characteristics

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Number of variables: 27

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) INFPARLEFTT     | <i>MRI: Left inferior parietal thickness (millimeters)</i>    |
| 5) INFPARRIGHTT    | <i>MRI: Right inferior parietal thickness (millimeters)</i>   |
| 6) INFTEMPLEFTT    | <i>MRI: Left inferior temporal thickness (millimeters)</i>    |
| 7) INFTEMPRIGHTT   | <i>MRI: Right inferior temporal thickness (millimeters)</i>   |
| 8) MIDTEMPLEFTT    | <i>MRI: Left middle temporal thickness (millimeters)</i>      |
| 9) MIDTEMPRIGHTT   | <i>MRI: Right middle temporal thickness (millimeters)</i>     |
| 10) POSTCINGLEFTT  | <i>MRI: Left posterior cingulate thickness (millimeters)</i>  |
| 11) POSTCINGRIGHTT | <i>MRI: Right posterior cingulate thickness (millimeters)</i> |
| 12) PRECUNELEFTT   | <i>MRI: Left precuneus thickness (millimeters)</i>            |
| 13) PRECUNERIGHTT  | <i>MRI: Right precuneus thickness (millimeters)</i>           |
| 14) SUPPARLEFTT    | <i>MRI: Left superior parietal thickness (millimeters)</i>    |
| 15) SUPPARRIGHTT   | <i>MRI: Right superior parietal thickness (millimeters)</i>   |
| 16) TEMPPOLELEFTT  | <i>MRI: Left temporal pole thickness (millimeters)</i>        |
| 17) TEMPPOLERIGHTT | <i>MRI: Right temporal pole thickness (millimeters)</i>       |
| 18) ENTCLEFTT      | <i>MRI: Left entorhinal cortex thickness (millimeters)</i>    |
| 19) ENTCRIGHTT     | <i>MRI: Right entorhinal cortex thickness (millimeters)</i>   |
| 20) CUNEUSLEFTT    | <i>MRI: Left cuneus thickness (millimeters)</i>               |
| 21) CUNEUSRIGHTT   | <i>MRI: Right cuneus thickness (millimeters)</i>              |
| 22) LATOCCLEFTT    | <i>MRI: Left lateral occipital thickness (millimeters)</i>    |
| 23) LATOCCRIGHTT   | <i>MRI: Right lateral occipital thickness (millimeters)</i>   |
| 24) POSTCENTLEFTT  | <i>MRI: Left postcentral thickness (millimeters)</i>          |
| 25) POSTCENTRIGHTT | <i>MRI: Right postcentral thickness (millimeters)</i>         |
| 26) PRECENTLEFTT   | <i>MRI: Left precentral thickness (millimeters)</i>           |
| 27) PRECENTRIGHTT  | <i>MRI: Right precentral thickness (millimeters)</i>          |

- 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             | MRI                                |
| Question Text      | NA                                 |
| Time of Collection | Baseline and Follow-up             |
| Data Type          | Numeric                            |
| Allowable Codes    | Integers and decimals from 1 to 10 |
| Missing OK If      | NA                                 |
| Audit Findings     | No NIH or JHU audit                |
| Comments           | Visit when MRI was completed       |

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

|           |                    |                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>4)</b> | Variable Name      | <b>INFPARLEFTT</b>                                                                                                                                                                                                                                                                                                                                                                                    |
|           | Short Description  | MRI: Left inferior parietal thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                   |
|           | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|           | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|           | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|           | Allowable Codes    | Min = 2.00<br>Max = 2.87                                                                                                                                                                                                                                                                                                                                                                              |
|           | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|           | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|           | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |

- 5)      Variable Name    **INFPARRIGHTT**
- Short Description    MRI: Right inferior parietal thickness (millimeters)
- Question Text      NA
- Time of Collection    Baseline and Follow-up
- Data Type          Numeric
- Allowable Codes    Min = 2.05  
Max = 2.92
- Missing OK If      NA
- Audit Findings      NA
- Comments          Measurement information available at:  
Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y.
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- 6)      Variable Name    **INFTEMPLEFTT**
- Short Description    MRI: Left inferior temporal thickness (millimeters)
- Question Text      NA
- Time of Collection    Baseline and Follow-up
- Data Type          Numeric
- Allowable Codes    Min = 2.24  
Max = 3.08
- Missing OK If      NA
- Audit Findings      NA
- Comments          Measurement information available at:  
Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y.

- 7)      Variable Name      **INFTEMPRIGHTT**
- Short Description      MRI: Right inferior temporal thickness (millimeters)
- Question Text      NA
- Time of Collection      Baseline and Follow-up
- Data Type      Numeric
- Allowable Codes      Min = 2.28  
Max = 3.16
- Missing OK If      NA
- Audit Findings      NA
- Comments      Measurement information available at:  
Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y.
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- 8)      Variable Name      **MIDTEMPLEFTT**
- Short Description      MRI: Left middle temporal thickness (millimeters)
- Question Text      NA
- Time of Collection      Baseline and Follow-up
- Data Type      Numeric
- Allowable Codes      Min = 2.36  
Max = 3.39
- Missing OK If      NA
- Audit Findings      NA
- Comments      Measurement information available at:  
Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y.

- 9)      Variable Name      **MIDTEMPRIGHTT**
- Short Description      MRI: Right middle temporal thickness (millimeters)
- Question Text      NA
- Time of Collection      Baseline and Follow-up
- Data Type      Numeric
- Allowable Codes      Min = 2.39  
Max = 3.45
- Missing OK If      NA
- Audit Findings      NA
- Comments      Measurement information available at:  
Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y.
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- 10)      Variable Name      **POSTCINGLEFTT**
- Short Description      MRI: Left posterior cingulate thickness (millimeters)
- Question Text      NA
- Time of Collection      Baseline and Follow-up
- Data Type      Numeric
- Allowable Codes      Min = 2.12  
Max = 3.09
- Missing OK If      NA
- Audit Findings      NA
- Comments      Measurement information available at:  
Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y.

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|------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>11)</b> | Variable Name      | <b>POSTCINGRIGHTT</b>                                                                                                                                                                                                                                                                                                                                                                                 |
|            | Short Description  | MRI: Right posterior cingulate thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 2.19<br>Max = 3.08                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |
| <b>12)</b> | Variable Name      | <b>PRECUNELEFTT</b>                                                                                                                                                                                                                                                                                                                                                                                   |
|            | Short Description  | MRI: Left precuneus thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                           |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 1.94<br>Max = 2.85                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |

- 13)**
- |                    |                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Variable Name      | <b>PRECUNERIGHTT</b>                                                                                                                                                                                                                                                                                                                                                                                  |
| Short Description  | MRI: Right precuneus thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                          |
| Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
| Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
| Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
| Allowable Codes    | Min = 2.00<br>Max = 2.79                                                                                                                                                                                                                                                                                                                                                                              |
| Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
| Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
| Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |
- 14)**
- |                    |                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Variable Name      | <b>SUPPARLEFTT</b>                                                                                                                                                                                                                                                                                                                                                                                    |
| Short Description  | MRI: Left superior parietal thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                   |
| Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
| Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
| Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
| Allowable Codes    | Min = 1.70<br>Max = 2.51                                                                                                                                                                                                                                                                                                                                                                              |
| Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
| Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
| Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |

- 15) Variable Name** **SUPPARRIGHTT**
- Short Description** MRI: Right superior parietal thickness (millimeters)
- Question Text** NA
- Time of Collection** Baseline and Follow-up
- Data Type** Numeric
- Allowable Codes** Min = 1.73  
Max = 2.49
- Missing OK If** NA
- Audit Findings** NA
- Comments** Measurement information available at:  
Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y.
- 16) Variable Name** **TEMPPOLELEFTT**
- Short Description** MRI: Left temporal pole thickness (millimeters)
- Question Text** NA
- Time of Collection** Baseline and Follow-up
- Data Type** Numeric
- Allowable Codes** Min = 2.52  
Max = 4.56
- Missing OK If** NA
- Audit Findings** NA
- Comments** Measurement information available at:  
Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y.

|            |                    |                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>17)</b> | Variable Name      | <b>TEMPPOLERIGHTT</b>                                                                                                                                                                                                                                                                                                                                                                                 |
|            | Short Description  | MRI: Right temporal pole thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                      |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 2.74<br>Max = 4.68                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |
| <b>18)</b> | Variable Name      | <b>ENTCLEFTT</b>                                                                                                                                                                                                                                                                                                                                                                                      |
|            | Short Description  | MRI: Left entorhinal cortex thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                   |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 2.29<br>Max = 4.14                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |

|            |                    |                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>19)</b> | Variable Name      | <b>ENTCRIGHTT</b>                                                                                                                                                                                                                                                                                                                                                                                     |
|            | Short Description  | MRI: Right entorhinal cortex thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                  |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 2.21<br>Max = 4.45                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |
| <b>20)</b> | Variable Name      | <b>CUNEUSLEFTT</b>                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Short Description  | MRI: Left cuneus thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                              |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 1.45<br>Max = 2.42                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |

|            |                    |                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>21)</b> | Variable Name      | <b>CUNEUSRIGHTT</b>                                                                                                                                                                                                                                                                                                                                                                                   |
|            | Short Description  | MRI: Right cuneus thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                             |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 1.56<br>Max = 2.70                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |
| <b>22)</b> | Variable Name      | <b>LATOCLEFTT</b>                                                                                                                                                                                                                                                                                                                                                                                     |
|            | Short Description  | MRI: Left lateral occipital thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                   |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 1.88<br>Max = 2.82                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |

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| <b>23)</b> | Variable Name      | <b>LATOCRIGHTT</b>                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Short Description  | MRI: Right lateral occipital thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                  |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 1.90<br>Max = 2.68                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |
| <b>24)</b> | Variable Name      | <b>POSTCENTLEFTT</b>                                                                                                                                                                                                                                                                                                                                                                                  |
|            | Short Description  | MRI: Left postcentral thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                         |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 1.60<br>Max = 2.50                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |

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| <b>25)</b> | Variable Name      | <b>POSTCENTRIGHTT</b>                                                                                                                                                                                                                                                                                                                                                                                 |
|            | Short Description  | MRI: Right postcentral thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                        |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 1.58<br>Max = 2.29                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |
| <b>26)</b> | Variable Name      | <b>PRECENTLEFTT</b>                                                                                                                                                                                                                                                                                                                                                                                   |
|            | Short Description  | MRI: Left precentral thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                          |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 1.61<br>Max = 2.71                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |

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| <b>27)</b> | Variable Name      | <b>PRECENTRIGHTT</b>                                                                                                                                                                                                                                                                                                                                                                                  |
|            | Short Description  | MRI: Right precentral thickness (millimeters)                                                                                                                                                                                                                                                                                                                                                         |
|            | Question Text      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Time of Collection | Baseline and Follow-up                                                                                                                                                                                                                                                                                                                                                                                |
|            | Data Type          | Numeric                                                                                                                                                                                                                                                                                                                                                                                               |
|            | Allowable Codes    | Min = 1.50<br>Max = 2.79                                                                                                                                                                                                                                                                                                                                                                              |
|            | Missing OK If      | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Audit Findings     | NA                                                                                                                                                                                                                                                                                                                                                                                                    |
|            | Comments           | Measurement information available at:<br>Measure obtained using FreeSurfer version 5.1, cross-sectional pipeline. For more information, see: Pettigrew C, Soldan A, Zhu Y, Wang M-C, Brown T, Miller M, Albert M; BIOCARD Research Team. Cognitive reserve and cortical thickness in preclinical Alzheimer's disease. Brain Imaging and Behavior 2017; 11(2):357-367. doi: 10.1007/s11682-016-9581-y. |