

New NACC Data: Research Structural MRI

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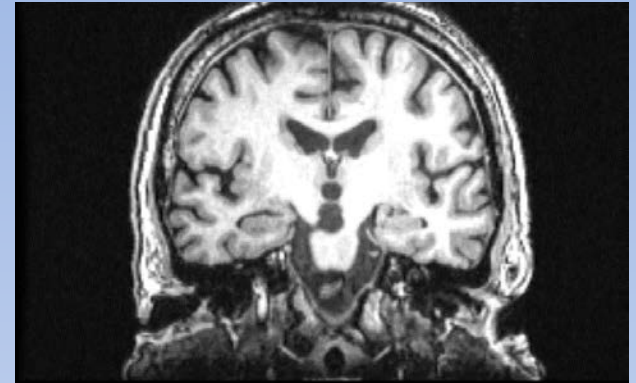
Kate Bristow Heller, MS

RESEARCH STRUCTURAL MRI Outline

- 1) MRI data collection
- 2) Image processing at NACC
- 3) Summary of MRI data
- 4) Researcher access
- 5) Next steps

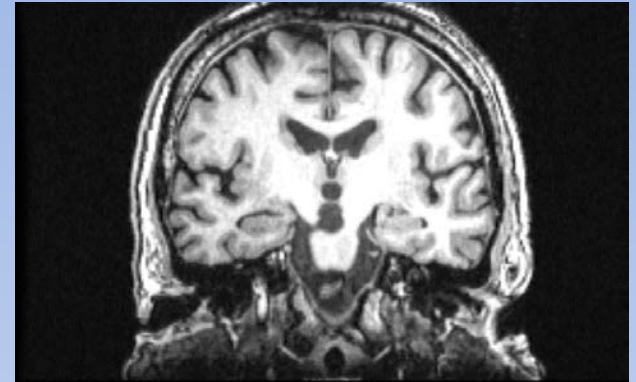
RESEARCH STRUCTURAL MRI Data collection

- Subject population
 - UDS subjects
 - 2005 – present
- IRB approval and consent
 - All ADC research data
 - MRI or imaging data



RESEARCH STRUCTURAL MRI

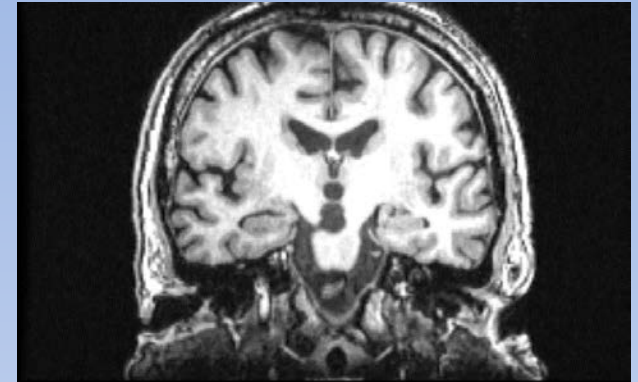
Data collection



- Research structural MRI
- Scan types
 - 3D T1-weighted (e.g., MPRAGE, FSPGR)
 - FLAIR (e.g., turbo, fast, TSE)
 - DTI (e.g., 2.5mm/1300b/40dir, applicable gradient table)
 - T2
 - Additional scan types
- DICOM format
 - .zip by PTID and scan date

RESEARCH STRUCTURAL MRI

Data collection



- Upload / submission options

- 1) Batch upload (sFTP)

- Large numbers of scans at once
- .zip or tar.bz format
- PTID, scan date, and series description must be clearly identifiable

- 2) Direct upload to NACC's MRI Data Submission System

- Smaller numbers of scans
- NACC user ID and password
- PTID, scan date, scan types

RESEARCH STRUCTURAL MRI

Direct upload

BIDSS

NACC Biospecimen and Imaging Data Submission System

Research Structural MRI Data Submission System

MRI Home

UPLOAD and PRE-PROCESS FILES

WEB DATA ENTRY

ERROR CHECK

FINALIZE DATA

REPORTS

DOWNLOAD DATA

FORMS AND DOCUMENTATION

HELP

Sample Center

Welcome to the Research Structural MRI Data Submission System

NACC's structural MRI data submission system is designed to collect and store the following data on UDS Clinical Co

- Quantitative data
- hippocampal volume
- DICOM image files

Quantitative data and DICOM images may be uploaded together or separately. When both are available, the system will use the DICOM files, and DICOM image files will be used to generate the quantitative data.

Please refer to the User Manual for help in navigating the system and uploading data. For more assistance, contact NACC at NACCmail@uw.edu, or (206) 543-8637.

Data submission timing

Submitting MRI data and DICOM files is optional for Centers but highly encouraged. We ask that all data available on UDS subjects be uploaded initially and that subsequent scan sessions be uploaded at least twice a year.

Viewing DICOM Images

Visualization software is required to view DICOM MRIs. Many software packages are available on the web as freeware or free trials, and can be located by doing a web-search for "DICOM viewer".

UPLOAD and PRE-PROCESS FILES

Quantitative Data

Upload DICOM Image Files

Upload DTI Gradient Table

View Batch Processing Log

edu

BIDSS

NACC Biospecimen and Imaging Data Submission System

Research Structural MRI Data Submission System

MRI Home

UPLOAD and PRE-PROCESS FILES

Quantitative Data

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Sample Center

Upload MRI DICOM Images

Please be sure that, at a minimum, patient name and Social Security number (if applicable) are stripped from the MRI scan before uploading files. After an image file is uploaded, NACC checks the contents of each file to ensure proper de-identification, and removes or replaces any remaining identifiable information.

Please upload the following scan types, as available, for ADC Clinical Core subjects:

- 3D T1-weighted (e.g., MPRAGE, FSPGR)
- FLAIR (e.g., turbo, fast, TSE)
- DTI (e.g., 2.5mm/1300b/40dir, plus applicable gradient table)

Image series can be uploaded as:

- A .zip file of all available scan types for a given subject and scan date
- Separate .zip files of individual scan types for a given subject and scan date

Select the ID of the subject whose images you are uploading:

Date of image acquisition: / /

Scan type (check all that apply): T1 Flair DTI T2

DICOM file(.zip) to upload: No file chosen

RESEARCH STRUCTURAL MRI Image processing

- Tailored to each Center
- DICOM de-identification
 - Unique SAS program
 - Patient ID → NACCID
 - Institution name → NACCADC
 - Identifiable tags stripped
 - Metadata stored

Tag	Name	Action	Value
(0008,0005)	Specific Character Set	Keep	ISO_IR_100
(0008,0008)	Image Type	Keep	CRASBVAL PRSBRARY/OTHER
(0008,0016)	SCP Class UID	Keep	1.2.840.10008.5.1.4.1.1.4
(0008,0018)	SCP Instance UID	Keep	1.2.840.113619.2.212.0945.2378830.30498.1267134225.957
(0008,0020)	Study Date	Keep	20100304
(0008,0021)	Series Date	Keep	20100304
(0008,0022)	Acquisition Date	Keep	20100304
(0008,0023)	Content Date	Keep	20100304
(0008,0020)	Study Time	Keep	091512
(0008,0021)	Series Time	Keep	093445
(0008,0022)	Acquisition Time	Keep	093445
(0008,0023)	Content Time	Keep	093445
(0008,0090)	Accession Number	Keep	
(0008,0060)	Modality	Keep	MR
(0008,0070)	Manufacturer	Keep	GE MEDICAL SYSTEMS
(0008,0080)	Institution Name	Keep	6499
(0008,0090)	Referring Physician's Name	Keep	
(0008,1010)	Station Name	Keep	
(0008,1030)	Study Description	Keep	
(0008,103E)	Series Description	Keep	Ax FSPGR BRAVO
(0008,1070)	Operator's Name	Keep	
(0008,1090)	Manufacturer's Model Name	Keep	DISCOVERY MR750
(0009,0010)	Private Creator Data Element	Keep	GEMS_IDEH_D1
(0009,1002)	?	Keep	Private
(0009,1004)	?	Keep	SIGNA
(0009,1027)	?	Keep	1267695285
(0009,1030)	?	Keep	Private
(0009,1031)	?	Keep	9999
(0009,10E3)	?	Keep	1.2.840.113619.1.212.5.6945.2378838
(0009,10E9)	?	Keep	1267695285
(0010,0010)	Patient's Name	Keep	
(0010,0020)	Patient ID	Keep	NACC172271
(0010,0030)	Patient's Birth Date	Keep	
(0010,0040)	Patient's Sex	Keep	M
(0010,1010)	Patient's Age	Keep	0757
(0010,1030)	Patient's Weight	Keep	75
(0010,2180)	Additional Patient History	Keep	
(0018,0020)	Scanning Sequence	Keep	GR
(0018,0021)	Sequence Variant	Keep	SSFOK
(0018,0022)	Scan Options	Keep	FAST_GEMSETR_GEMSIACC_GEMS
(0018,0023)	MR Acquisition Type	Keep	3D
(0018,0028)	Angio Flag	Keep	N
(0018,0050)	Slice Thickness	Keep	1
(0018,0080)	Repetition Time	Keep	8.104
(0018,0081)	Echo Time	Keep	3.104
(0018,0082)	Inversion Time	Keep	450
(0018,0083)	Number of Averages	Keep	1
(0018,0094)	Imaging Frequency	Keep	127.76074
(0018,0095)	Imaged Nucleus	Keep	1H
(0018,0096)	Echo Number(s)	Keep	1
(0018,0097)	Magnetic Field Strength	Keep	3
(0018,0098)	Spacing Between Slices	Keep	1
(0018,0099)	Echo Train Length	Keep	1
(0018,009A)	Percent Sampling	Keep	100
(0018,0094)	Percent Phase Field of View	Keep	100
(0018,0095)	Pixel Bandwidth	Keep	244.141
(0018,1000)	Device Serial Number	Keep	
(0018,1020)	Software Version(s)	Keep	201XVWR Software release:20_0_M4_0923.c
(0018,1030)	Protocol Name	Keep	
(0018,1088)	Heart Rate	Keep	64
(0018,1090)	Cardiac Number of Images	Keep	0
(0018,1094)	Trigger Window	Keep	0
(0018,1100)	Reconstruction Diameter	Keep	256
(0018,1250)	Receive Coil Name	Keep	8-IRBRAIN
(0018,1310)	Acquisition Matrix	Keep	256/0/0/256
(0018,1312)	In-plane Phase encoding Direc...	Keep	COL

Example metadata stored in DICOM headers

RESEARCH STRUCTURAL MRI

Image processing

- **Status table**

- e.g., PTID, ADC ID, acquisition date, type of scans included in file, study description, manufacturer, model name, device serial number.
- flag for de-identified image file

- **Protocol table**

- e.g., NACCID, MRI date, series description, slice thickness, repetition time, echo time.

Participating Centers

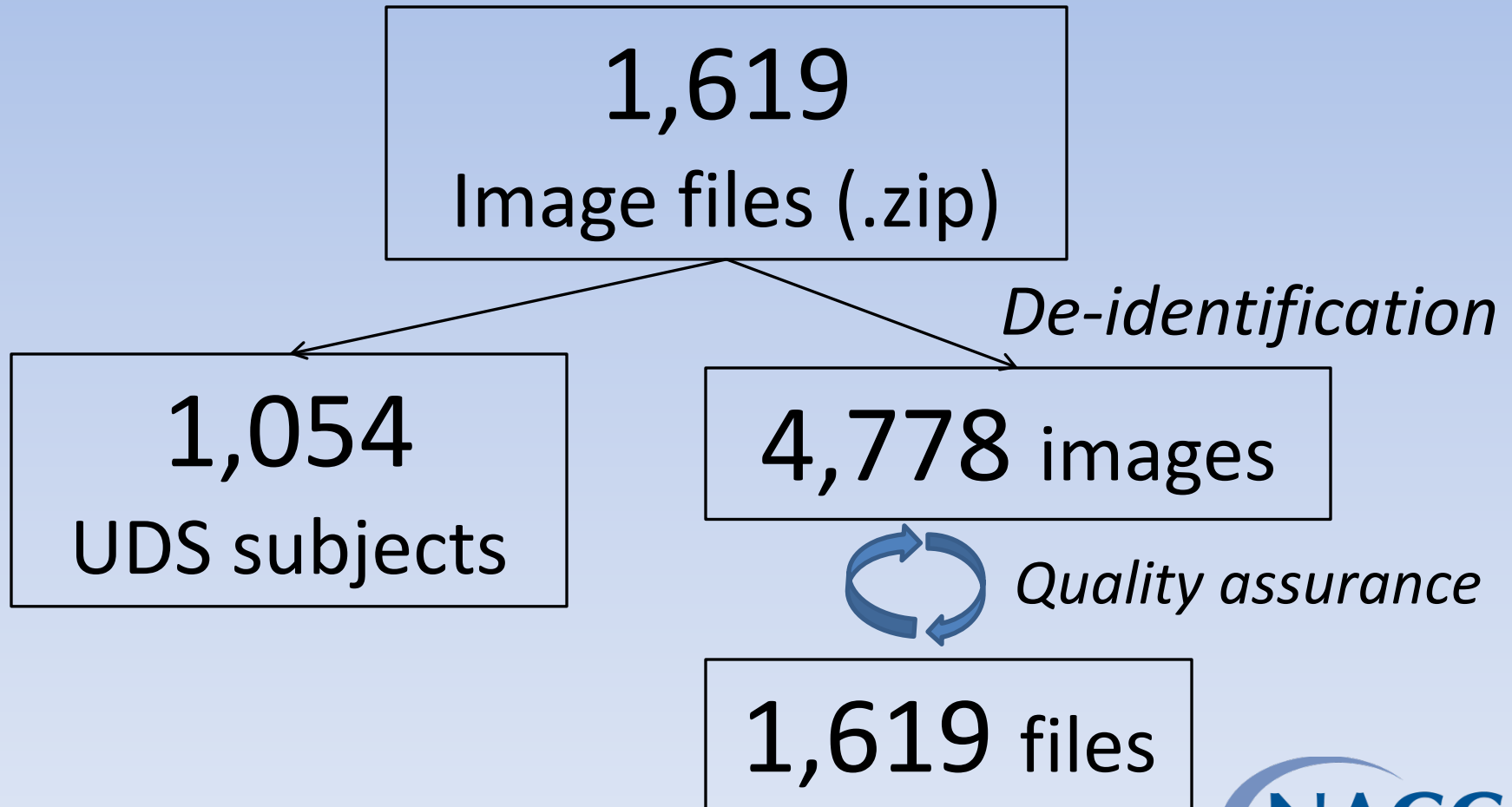
- Uploaded test images
 - Wisconsin
 - Kentucky
 - OHSU
 - UC Davis
 - UCSF

- Uploaded batch MRIs

Center	Number of Image Files
Wisconsin	313
UC Davis	1,141
OHSU	115
USC	50

- Future participants
 - Mass
 - U Penn
 - Pittsburgh
 - Kansas
 - UCSF

RESEARCH STRUCTURAL MRI MRI Data Summary



Numbers as of October 1, 2013

RESEARCH STRUCTURAL MRI

MRI Data Summary

Scan properties

Scan Type	Images
3D T1	1,534
FLAIR	1,576
DTI	1,314
Other	354
Magnetic field strength (T)	
1.5	3,488
3.0	1,290
Total images	4,778

Numbers as of October 1, 2013

RESEARCH STRUCTURAL MRI

MRI Data Summary

Associated UDS visit characteristics

Characteristic	MRI files (n=1,619)
Age at closest UDS visit, n (%)	
<65	222 (13.7)
65-89	1324 (81.8)
≥90	73 (4.5)
Diagnosis at closest UDS visit, n (%)	
Normal Cognition*	941 (58.1)
MCI	373 (23.0)
Demented	305 (18.8)

Numbers as of October 1, 2013

*Includes diagnoses of impaired, not MCI.

RESEARCH STRUCTURAL MRI

MRI Data Summary

Longitudinal data

Number of MRIs per subject	UDS subjects with image files at NACC (n=1,054)
1	683
2	212
3+	159

Numbers as of October 1, 2013

RESEARCH STRUCTURAL MRI

Researcher access

- Current availability (ADC personnel)
 - downloadable .zip files
 - MRI data submission system
 - NACC user ID and password
- Coming soon (All researchers)
 - Imaging query
 - Clinical characteristics
 - Scan properties
 - NACC data request system

RESEARCH STRUCTURAL MRI

Next steps

- Data from additional Centers
- Researcher access
- Quantitative measures
 - Intracranial volume
 - Brain volume
 - Hippocampal volume

RESEARCH STRUCTURAL MRI

Contact information

NACC user ID and password:

Elizabeth Robichaud, naccmail@uw.edu

Consent forms:

Maggie Dean, connorm@uw.edu

Batch upload (set up sFTP):

Duane Beekly, beekly@uw.edu

Joylee Wu, joyleewu@uw.edu

Questions?

Kate Bristow Heller, kbristow@uw.edu

Thank you

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National Institute on Aging



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