The National Cell Repository for Alzheimer’s Disease

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U24AG21886
NCRAD, NACC and the ADCs have a strong collaboration

• Data for ADC Contributed Samples
  • 25,230 with APOE
  • 16,198 with GWAS ADC 1-9
  • 11,378 with exome chip
  • 3,261 with WES through the ADSP
  • 1,183 with WGS through the ADSP
    • ~3,000 more included in ADSP follow up studies
  • ~9,000 individuals without GWAS
    • Opportunity for new research efforts

*all totals above include Phase 1 and Phase 2 subjects
NCRAD banks samples for 28 studies

- One ‘study’ is the ADCs
- Bank samples from 27 other studies
  - Receive samples from ongoing studies as well as closed studies
- NCRAD has samples from > 63,000 subjects
  - ~500,000 sample aliquots received
NCRAD Specific Aims

Aim 1
Samples in

Aim 2
Samples out
NCRAD Expansion

• Goal: Meet the growing research needs due to increases in NIA funding
• Meet needs of researchers requesting samples
  • Ensure that a broad range of biospecimens are available from a wide range of studies
• Offer central banking and biorepository management to more research studies
  • Prioritize studies with diverse cohorts, unique patient populations, extensive longitudinal data
NCRAD Study Support
https://www.ncrad.org/
Tools for Active Studies
NCRAD’s Services:

• Create Manual of Procedures
• Supply Kits
  • Supplies to draw, process, and ship supplies back to NCRAD
• Provide Study Coordinator Training
• Array of Services Including Sample Receipt, Processing, and Storage
• Fulfill Sample Orders from Approved Investigators
To learn more….

• NIA encourages research studies to utilize NCRAD for biospecimen management
  • Contact NCRAD when preparing a grant application to obtain more information
  • Contact NCRAD if samples from a completed study could be shared with other researchers

• Is there a new specimen protocol you want to implement and need advice?… Contact NCRAD
  kelfaber@iu.edu or alzstudy@iu.edu
## NCRAD Sample Distributions

Since Inception (through 6/30/2017)

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td># researchers</td>
<td>145</td>
</tr>
<tr>
<td># DNA</td>
<td>211,271</td>
</tr>
<tr>
<td># blood</td>
<td>811</td>
</tr>
<tr>
<td># cell lines</td>
<td>1,939</td>
</tr>
<tr>
<td># plasma</td>
<td>6,418</td>
</tr>
<tr>
<td># serum</td>
<td>115</td>
</tr>
<tr>
<td># PBMC</td>
<td>12</td>
</tr>
<tr>
<td># RNA</td>
<td>50</td>
</tr>
</tbody>
</table>
NCRAD Sample Distributions

• More requests for samples other than DNA
  • Plasma, serum, and CSF, increasing requested

• Investigators need to pair clinical data and genetic data to select samples for other studies

• NCRAD is developing approaches to make it easy to query this information and select samples
NCRAD Catalogs
Navigating to the NCRAD Catalogs

Within the NCRAD website, in the Accessing Biospecimens and Data section, catalogs can be accessed.  
https://www.ncrad.org/accessing_data.html
NCRAD Data Agreement

Researchers can complete a web-based Data Agreement to obtain a username and password to the restricted catalogs.

Section I: Access, Use, and Safeguards

A. I will receive de-identified data and will not attempt to establish the identity of, or attempt to contact any of the subjects with data in NCRAD.
B. I will not attempt to identify any specific study sites unless NCRAD has approved such identification as part of my project’s protocol.
C. I understand that distributing these data to a third party in prohibited, and therefore I will not distribute these data beyond the uses outlined in this agreement. A third party is defined as anyone who is not a collaborator or co-author on the analyses defined in my proposal.
D. I will require anyone on my team who uses the data or anyone with whom I share these data, to comply with this Data Agreement.
E. I will accurately provide the requested information about persons who will use the data and analyses that are planned using these data.
F. I will comply with any rules and regulations imposed by my institution and its institutional review board in requesting and using these data.
G. I understand that any data I download may change as new quality assurance measures are implemented and data records are updated.
H. I will ensure that investigators who utilize data obtained from NCRAD use appropriate administrative, physical, and technical safeguards to prevent use or disclosure of the data other than as provided for by this agreement.
I. I will report any use or disclosure of the data not provided for by this agreement of which I become aware within 15 days of becoming aware of such use or disclosure.

Section II: Data Analysis

A. I will respond promptly and accurately to NCRAD’s requests for updates on the status of my analyses.
B. I will review the data documentation provided by NCRAD and consult with NCRAD research coordinators in order to ensure the proper use and description of study data in my analysis and any ensuing publications or presentations, as well as to ensure the understanding of subtle data complexities.
C. If more than 1 year passes before publication, I will download any updated dataset to ensure the most accurate and up to date data is used.

Section III: Publication

A. I will include the NCRAD acknowledgement for all samples and data obtained:

Samples and data from the National Cell Repository for Alzheimer’s Disease (NCRAD), which receives government support under a cooperative agreement grant (U04-AG11896) awarded by the National Institute on Aging (NIA), were used in this study. We thank contributors who collected samples used in this study, as well as patients and their families, whose help and participation made this work possible.

1. NIA-LOAD: The NIA-LOAD study supported the collection of samples used in this study through National Institute on Aging (NIA) grants U24AG026395 and R01AG041797. We thank contributors, including the Alzheimer’s Disease Centers who collected samples used in this study, as well as patients and their families, whose help and participation made this work possible.

2. Indianapolis-Ibadan: The Indianapolis-Ibadan dementia project is a 20 year comparative community based epidemiological study of the prevalence, incidence and risk factors for AD and dementia in populations of African origin, elderly African Americans in Indianapolis, Indiana and Yoruba in Ibadan, Nigeria. It was supported from 1991-2012 by NIH grants R01 AG029956 and P30 AG 10133. We would like to take this opportunity to thank the many faculty and staff of the University of Ibadan and Indiana University School of Medicine for their involvement as well as the 4000 plus elderly participants at each of the sites.

B. I will notify NCRAD if my manuscript is accepted for publication and/or presentation.
C. I will ensure the proper submission of all published work to PubMed Central (PMC) in order to comply with the NIH Public Access Policy.

I understand that failure to abide by these guidelines will result in termination of my privileges to access NCRAD data.

☐ I AGREE to the terms outlined above

You must click the "I AGREE" box above to proceed.
NCRAD Catalogs

After obtaining a username and password from the NCRAD staff, researchers will be able to log directly into the specimen catalog to review a subset of data.
The catalog system is designed to allow researchers to determine which sample collections best fit their research needs and perform feasibility checks before applying for or requesting the samples. The researcher will have the option to download their selected sample set and include that with their application.
Filter by Specimen Criteria

Researchers can use the sidebar to filter for the specific samples that meet their request criteria. When the categories on the left are selected, they will appear in the dataset to the right. Variables can be chosen by range of numbers, such as age, or text options, such as baseline diagnosis.

For variable “Baseline diagnosis”- Alzheimer’s disease dementia was chosen as a variable and therefore shows up in the dataset.
By clicking here, the data dictionary box appears.

### Data Dictionary

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample ID</td>
<td>Sample identifier</td>
</tr>
<tr>
<td>GUID</td>
<td>Subject identifier</td>
</tr>
<tr>
<td>ARTFL</td>
<td>Is the subject enrolled in ARTFL?</td>
</tr>
<tr>
<td>LEFTTOS</td>
<td>Is the subject enrolled in LEFTTOS</td>
</tr>
<tr>
<td>Sex</td>
<td>Subject Gender</td>
</tr>
<tr>
<td>Race</td>
<td>Subject Race</td>
</tr>
<tr>
<td>Hispanic</td>
<td>Subject Ethnicity</td>
</tr>
<tr>
<td>Deceased</td>
<td>Has the subject died?</td>
</tr>
<tr>
<td>Age at Baseline Blood</td>
<td>Age at baseline blood collection</td>
</tr>
<tr>
<td>Age at Last Blood</td>
<td>Age at last blood collection</td>
</tr>
<tr>
<td>Age at Baseline CSF</td>
<td>Age at baseline CSF collection</td>
</tr>
<tr>
<td>Age at Last CSF</td>
<td>Age at last CSF collection</td>
</tr>
<tr>
<td>Baseline Diagnosis</td>
<td>Subject diagnosis at baseline visit</td>
</tr>
<tr>
<td>Last Diagnosis</td>
<td>Subject’s most recent clinical diagnosis</td>
</tr>
<tr>
<td>Relevant Mutation</td>
<td>Is there a relevant mutation in the subject’s family?</td>
</tr>
<tr>
<td>Age at Onset</td>
<td>At what age did the subject begin to show symptoms of FTD?</td>
</tr>
<tr>
<td>Specimen Type</td>
<td>Sample type collected (wax, pblmc, plasma, buffy coat, serum, csf)</td>
</tr>
<tr>
<td>Visit</td>
<td>Which visit the samples were collected at</td>
</tr>
<tr>
<td>Specimen Quantity</td>
<td>Available sample amount</td>
</tr>
<tr>
<td>Quantity UOM</td>
<td>Unit of Measurement (for samples)</td>
</tr>
<tr>
<td>Specimen Count</td>
<td>How many samples are available at NCBO</td>
</tr>
<tr>
<td>Additional Stock</td>
<td>Additional specimens for this sample type from a subject’s visit</td>
</tr>
<tr>
<td>Concentration</td>
<td>Concentration for RNA DNA</td>
</tr>
<tr>
<td>Concentration UOM</td>
<td>Unit of Measurement (for concentration)</td>
</tr>
<tr>
<td>RNA Value</td>
<td>Risk Integrity Number (RNA Value)</td>
</tr>
<tr>
<td>240/260 Ratio</td>
<td>240/260 Ratio</td>
</tr>
<tr>
<td>rRatio</td>
<td>rRatio</td>
</tr>
<tr>
<td>Clotting</td>
<td>Clotad</td>
</tr>
</tbody>
</table>
Join Data

For many studies, more extensive data can be obtained from the study’s data coordinating center. The catalog system supports joining this external data with the NCRAD biospecimen catalog data. This allows researchers to easily filter and select specimens based on criteria outside of those available in the catalog.

By clicking here, the join external data box appears.
Sample Selection

Researchers can individually select the samples they want, which highlights the selection in blue. They can also use the selection tool at the top to select all, none, or invert their selection.

By clicking here, selection options appear.

In the bottom right corner, the catalog will show how many samples are selected and how many samples are displayed.
Download Selection

Researchers will have the option to download the entire dataset, just the filtered specimens, or their selected specimens. An excel file will download to the desktop.
Help

The “Help” tab walks researchers through the catalog sections such as the toolbar and sidebar. It explains in detail how to filter, join data, and download files.

By clicking here, the help section will appear and can be explored with its different tabs.
Tour

This portion of the catalog walks researchers through the dataset step by step, such as explaining how to filter for specimen criteria or how to join data.

By clicking here, the tour will begin to walk through the catalog functions one by one.
Samples with genetic data at NIAGADS are hyperlinked directly to the information page for the dataset.
Link at NACC to NCRAD

<table>
<thead>
<tr>
<th>FTLD type, most recent FTLD module visit</th>
<th></th>
<th></th>
</tr>
</thead>
</table>

**Genetics**

<table>
<thead>
<tr>
<th>Available as:</th>
<th>ROW</th>
<th>COLUMN</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>APOE genotype available at NACC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APOE genotype</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of APOE ε4 alleles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject/family has known AD Mutation (APP, PS1, PS2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject/family has known FTLD mutation (MAPT, PGRN, C9orf72, FUS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genomic data/DNA samples available outside of NACC (ADGC, NIAGADS, NCRAD)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NACC Query System: UDS Subjects

NOTE: This query used versions 1-3 of UDS data

These data should be used only as rough, preliminary numbers. For publication purposes, please submit a custom data request

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<table>
<thead>
<tr>
<th>Genomic data/DNA samples available outside of NACC (ADGC, NIAGADS, NCRAD)</th>
<th>Frequency (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genotype data available at ADGC</td>
<td>11057</td>
</tr>
<tr>
<td>Genotype data available at NIAGADS</td>
<td>3285</td>
</tr>
<tr>
<td>Exome sequencing data available from dbGaP / ADSP</td>
<td>1857</td>
</tr>
<tr>
<td>DNA sample available at NCRAD</td>
<td>22883</td>
</tr>
<tr>
<td>Total UDS subjects</td>
<td>35768</td>
</tr>
</tbody>
</table>

Data from Additional genetic data
Created on September 1, 2017
Data as of June 1, 2017
www.alz.washington.edu
Link at NIAGADS to NCRAD
Publications using NCRAD Samples

- 500 publications to date using NCRAD samples
- [https://ncrad.org/publications.html](https://ncrad.org/publications.html)
Our Team
Acknowledgement

- NIA
- Alzheimer Disease Centers
- NACC
- NIAGADS
- ADGC
- Studies contributing samples to NCRAD

Questions/Contact: kelfaber@iu.edu or alzstudy@iu.edu

- NCRAD Executive Committee
  - Deborah Blacker (Chair)
  - Steve DeKosky
  - Bernie Devlin
  - Alison Goate
  - David Holtzman
  - Bud Kukull
  - Richard Mayeux
  - Rosa Rademakers
  - Gerard Schellenberg
  - Julie Schneider

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