Northwestern University
Neuroimaging Data Archive
NUNDA

Lei Wang, PhD
Psychiatry and Behavioral Sciences, Radiology
March 26, 2017
NUNDA people

• CTI
  – Todd Parrish, PhD
• NU XNAT Team
  – Kate Alpert
  – Alex Kogan
• NUIT QUEST Team
• Washington University XNAT Team
NUNDA at a glance

- Neuroimaging
- Processing & analysis
- Related data

NUNDA
- Data storage
- Data integration
- Data processing
- Data access
- Data visualization
- Data exploration

- Local users
- Collaborators
- Community

https://nunda.northwestern.edu
NUNDA at a glance

CTI  BU  JHU  MGH  ...

NUNDA
Data storage
Data integration
Data processing
Data access
Data visualization
Data exploration

https://nunda.northwestern.edu
NUNDA at a glance

- Launched in 2009
- 244 projects, 11,026 subjects, and 16,681 imaging sessions
- 566 Registered Users
NUNDA at a glance

**Multisite projects**

<table>
<thead>
<tr>
<th>Faculty PI</th>
<th>Active Grant/Agency/Period/Direct Cost/Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cynthia Thompson</td>
<td>1 P50 DC012283-01A1 NIDCD (PI: Thompson), 4/1/13 – 3/31/18, $252,632 Neurobiology of Language Recovery in Aphasia: Natural History and Treatment-Induced Recovery</td>
</tr>
<tr>
<td>Lei Wang</td>
<td>1 U01 MH097435-01A1 NIMH (PI-Contact, co-PIs: Potkin, Ambite, Turner) 3/19/13 – 1/31/17 $435,875 SchizConnect: Large-Scale Schizophrenia Neuroimaging Data Mediation &amp; Federation</td>
</tr>
</tbody>
</table>

- Psychiatry (15)
- Radiology (11)
- MSS (6)
- Neurology (4)
- CNADC (3)
- Physiology (3)
- Communication (2)
- Psychology, Pediatrics, Endocrinology
- ...

**NU projects**

<table>
<thead>
<tr>
<th>Faculty PI</th>
<th>Active Grant/Agency/Period/Direct Cost/Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sameer Ansari</td>
<td>Grant-in-Aid, American Heart Association (Ansari) 07/01/13-06/30/15 $65,000 High Resolution 3T and Quantitative MRI of Intracranial Atherosclerotic Disease May Stratify Risk for Ischemic Stroke</td>
</tr>
<tr>
<td>Apkar Apkarian</td>
<td>SR01AT007987-02 NCCAM (Aapkarian) 9/30/13 - 5/31/18 Brain mechanisms for clinical placebo in chronic pain</td>
</tr>
<tr>
<td>Apkar Apkarian</td>
<td>2U01DK082342-06 NIDDK (Aapkarian) 9/15/14 - 6/30/19 Pelvic Pain and Depression</td>
</tr>
<tr>
<td>David Brang (mentor: Marcia Grabowecky)</td>
<td>K99/R00 DC013828 NIDCD Brang (PI) 12/1/14 – 11/30/19 $1,004,520 Networks underlying visual modulation of speech perception</td>
</tr>
<tr>
<td>M-Marsel Mesulam</td>
<td>2R01DC008552-06 NIDCD (Mesulam) 5/1/12 - 4/30/17 Language in Primary Progressive Aphasia</td>
</tr>
<tr>
<td>Emily Rogalski Miller</td>
<td>1R1AG045571-01 NIA (Rogalski) 9/30/14 - 4/30/19 Exceptional Cognitive Aging: Neuropsychologic, Anatomic and Pathologic Correlates</td>
</tr>
<tr>
<td>Greggory Miller</td>
<td>1R01HL122328-01A1 NIH (Miller) 12/14-11/18 $530,167 Childhood Origins of CHD Disparities: Neural &amp; Immune Pathways</td>
</tr>
<tr>
<td>Todd Parrish</td>
<td>Michael J. Fox Foundation for Parkinson's Research 1/1/12 - 12/31/15 Parkinson's Progression Markers Initiative: Resting State MRI</td>
</tr>
<tr>
<td>Joel Voss</td>
<td>R01-MH106512 NIMH (PI: Voss), To start 9/1/15 4/1/15-3/31/20 $429,486 Noninvasive manipulation of hippocampal-cortical brain networks and memory</td>
</tr>
<tr>
<td>Lauren Wakschlag</td>
<td>2U01-MH062630 – 06 NIMH (Wakschlag) 03/14 - 02/26/19 $538,059 Dimensions of Early Temper Loss and Low Concern: Clinical Utility and Mechanisms</td>
</tr>
<tr>
<td>Lei Wang</td>
<td>1 R01 NR144182-01 NINR (PI: Wang) 9/26/12 - 6/30/17, $329,939 HippoPCI Hippocampal Predictors of Cognitive Impairment in Breast Cancer Patients</td>
</tr>
</tbody>
</table>
NUNDA interface

- Project
- Subject
NUNDA interface

- Project
- Subject
- MR Session
NUNDA interface

- Project
- Subject
- MR Session
- Scan
1. Data capture
   - Push from CTI
   - Web upload
1. Data capture
2. Quality control
The header indicates the type of data in the listing. Listings are available for MR, PET, analyzed data, and custom non-image types.

1. Data capture
2. Quality control
3. Data exploration & download

Click here or on the data ID to view a detailed report. Click the ids to view details.

The columns that appear in a listing are tailored for the data type.
1. Data capture
2. Quality control
3. Data exploration & download
NUNDA pipelines

1. Data capture
2. Quality control
3. Data exploration & download
4. Image processing pipelines
NUNDA pipelines

- **Standard Structural Preprocessing (StdBuildNunda)**
  - DICOM → Analyze reconstruction
  - MPRAGE averaging
- **FreeSurfer Segmentation and Surface Generation (FSBuild)**
- **FreeSurfer-Initiated Large-Deformation Diffeomorphic Metric Mapping for Subcortical Segmentation (FSLDDMM)**
- **FSL Tissue Segmentation (FSL_SEG)**
  - Image segmentation into gray, white, CSF, tissue types
- **Resting-State Preprocessing (GenericBoldPreprocessingNunda)**
  - Resting-state BOLD scan preprocessing
  - Includes QC outputs
- **DTI Processing (StdDTIPreprocessing)**
  - DTI scan preprocessing with FSL
- **ASL Processing (StdASLProcessing)**
  - ASL scan preprocessing
NUNDA pipelines

CTI | BU | JHU | MGH | ...

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High-Performance Computing

QUEST HPCC
NUNDA pipelines

- Communication using XNAT’s REST API
  - POST-ing pipeline’s progress
  - GET-ting DICOMs/images from NUNDA server
  - PUT-ting results onto NUNDA server