

ADNI 2

***Alzheimer's Disease Neuroimaging Initiative
3T MRI Technical Procedures Manual***

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I. Contact Information

- If you have any questions regarding the acquisition aspects of this protocol please contact:

adnimri@mayo.edu

- If you have any questions or problems regarding the data transfer to LONI for this protocol please contact:

adni@loni.ucla.edu

- If you have any questions regarding individual subjects please contact the study coordinator at your referral site.

II. ADNI2 3T Study Overview

Background

MRI measurements of brain structure have been shown to demonstrate brain atrophy (which correlates with neuron loss) in MCI and AD and increasing rates of brain atrophy as subjects become more impaired. Therefore, structural MRI is used as a measure of the rate of disease progression, and possibly as a measure of treatment effect, in AD treatment trials. Structural MRI (MPRAGE/IRSPGR) will continue in ADNI2 and the data will be used both as a measure of the rate of change as well as a predictor of future change, in all subjects. Cerebro-vascular disease, especially white matter lesions (WMLs) will be assessed with FLAIR. Recently, iron imaging especially micro bleeds (T2* GRE); has been used in anti-amyloid clinical trials, because of the association of microbleeds with anti-amyloid therapy; this will be measured with T2* GRE.

The Core MRI protocol consists of 3 types of sequences that are acquired in every subject and on every MRI vendor system these are: (1) structural MRI, (2) FLAIR, and (3) T2* GRE.

The experimental sub studies consist of three different types of sequences: (1) DTI, (2) ASL, (3) resting state functional connectivity. Each of these will be acquired on only one MRI vendor system – i.e. the experimental sequences will be vendor specific.

Goals

The overall goal of this project is to determine the relationships among the clinical, cognitive, imaging, genetic and biochemical biomarker characteristics of the entire spectrum of Alzheimer's disease (AD), as the pathology evolves from normal aging through very mild symptoms, to mild cognitive impairment (MCI), to dementia. ADNI2 continues the currently funded AD Neuroimaging Initiative (ADNI1), a public/private collaboration between academia and industry to study biomarkers of AD as well as a recently funded Grand Opportunities (GO) grant which supplements ADNI goals and activities. ADNI will inform the neuroscience of AD, identify diagnostic and prognostic markers, identify outcome measures that can be used in clinical trials, and help develop the most effective clinical trial scenarios.

The specific objectives of the MRI core include: 1) Obtaining high quality multi-site data that is consistent over time, and across different MRI systems. 2) Perform appropriate image quality control throughout the study. 3) Qualify (and re-qualify after upgrades) each scanner on the ADNI-GO MRI protocol. 4) Correct specific classes of image artifacts in each image acquired; imaging intensity nonuniformity, image warping due to gradient nonlinearity, and scaling changes over time. 5) Monitor each scanner

longitudinally in the study using the ADNI phantom. Unlike ADNI1, measurements from the phantom will not be used to modify accompanying human images. 6) Perform quantitative measurements of all images.

Study design for ADNI2

All subjects newly enrolled into ADNI2 will be scanned using the ADNI-GO 3T scanning protocol. These subjects will be scanned at Screening, 3 months from the Screening MRI, and then within 2 weeks before or after the Month 6 and subsequent annual visits.

EMCI subjects carried forward from ADNI-GO will continue with the more modern and expanded 3T scanning protocol initiated in ADNI-GO. Imaging for this group will occur annually, within 2 weeks before or 2 weeks after the in-clinic assessments.

CN and MCI subjects carried forward from ADNI1 are scanned with the original ADNI protocol on the existing ADNI 1.5T scanner at that site in order to maintain optimum longitudinal consistency unless and until a decision is made by the MRI Core that the site should perform 3T MRI scans on all subjects. Imaging for this group will occur annually, within 2 weeks before or 2 weeks after the in-clinic assessments.

Please refer to the original MRI Tech Manual from ADNI1 for CN and MCI subjects carried forward from ADNI1 to ADNI 2. These subjects are scanned with the original ADNI protocol sequence on the existing ADNI 1.5T scanner unless informed otherwise by the MRI Core.

III. Site Qualification

A. Site Qualification Overview:

Each site must be qualified for MRI. If the machine being used has already been certified by the ADNI MRI Core under ADNI1 or ADNI-GO and has not experienced any software upgrades, re-qualification will not be required.

Site qualification includes two different exams. The first, being a scan on the specially designed ADNI phantom with the ADNI-GO Phantom QC sequences loaded by your local service engineer. Secondly, your site will be asked to scan a human volunteer with the approved ADNI-GO Human sequences loaded by your local service engineer. Mayo QC will review the phantom and human scans for the protocol compliance and image quality.

Please note: All new enrollees in ADNI2 will be scanned using the ADNI-GO 3T scanning protocol, as well as any EMCI subject carried forward from ADNI-GO to ADNI2.

Only CN and MCI subjects carried forward from ADNI1 are scanned with the original ADNI protocol sequence on the existing ADNI 1.5T scanner.

QC Phantom Scan Protocol:

- 1) Localizer
 - 1a) Calibration/Reference Scan (if applicable)
- 2) QC Phantom MP-RAGE/IR-SPGR (Accelerated)
- 3) QC Phantom fMRI (Philips Systems)

Human Protocol:

*(All scans are performed in straight orthogonal planes -- Sagittal or Axial)
(No manual adjustments should be made to this protocol)*

- 1) Localizer
 - 1a) Calibration/Reference Scan (if applicable)
- 2) Sagittal MP-RAGE/IR-SPGR
- 3) Accelerated Sagittal MP-RAGE/IR-SPGR
- 4) Resting State fMRI (Philips Systems Only) - Subjects should have eyes OPEN.
- 4) Axial T2-FLAIR
- 5) Axial T2-Star
- 6) Axial ASL Perfusion (Siemens Systems Only) - Subjects should have eyes OPEN.
- 6) Axial DTI Scan (GE Systems)

After each scan protocol, please upload images to LONI (see Appendix 6) using the ADNI naming conventions detailed later in this section.

Any questions concerning site qualification scans please contact:
adnimri@mayo.edu

B. Phantom Scan Instructions:

For site qualification, each site must scan the ADNI phantom using the electronically loaded ADNI-GO QC Phantom Sequences.

Note: This can be done prior to IRB approval

Please Note: Mayo QC will be supplying electronic protocols (WIPs) for installation by your local service engineer. This will ensure that you have the correct protocol for your MRI scanner. If you have any questions about this procedure please contact:

adnimri@mayo.edu

Use only the imported ADNI GO sequences.

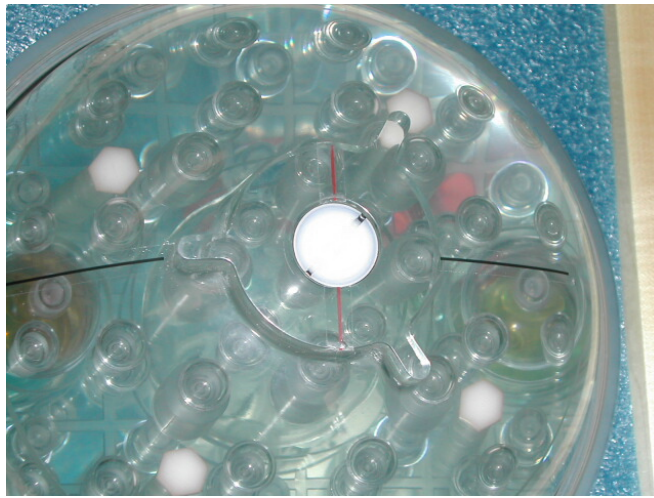
Phantom Positioning:

The following image shows the phantom placed in the appropriate position within the 8-channel coil. Achieving a reproducible position is a key element to the system performance analysis that will be conducted each day an ADNI subject(s) are imaged. The phantom should be placed in the coil with the alignment markers facing upward and the serial number SN XXXX positioned out of the bore as shown, along with alignment guides, will facilitate the reproducible positioning of your phantom.



ADNI phantom shown positioned inside of an 8-channel head coil.

Please note that your phantom has a base and positioning markers (in black and red, see image below). The phantom should be placed inside the head coil with the indicated “top” facing upwards. This orientation is due to space constraints within some coils and we would like to maintain a consistent orientation for all scanners across the ADNI2 study. Please inspect the phantom and note the additional marks added to help you position your phantom. We have indicated the top of the phantom with red and black marks to aid with placement in the coil.



The top of the phantom and the alignment lines are indicated above. These markings should be used with the alignment lights on your scanner to position the phantom.

Please place the phantom in your head coil with the alignment marks facing up, and the phantom SN number (e.g. 9996) facing you, out of the bore (see the following picture). Furthermore, try to align the center of the phantom with the center of the coil. Use the alignment lights on your scanner to position the phantom into the center of the magnet.



The phantom is shown in the correct position, with the Serial Number (SN 9999) positioned forward and reading correctly from right to left. This will be the typical scanning position for your phantom

Phantom Scan Protocol:

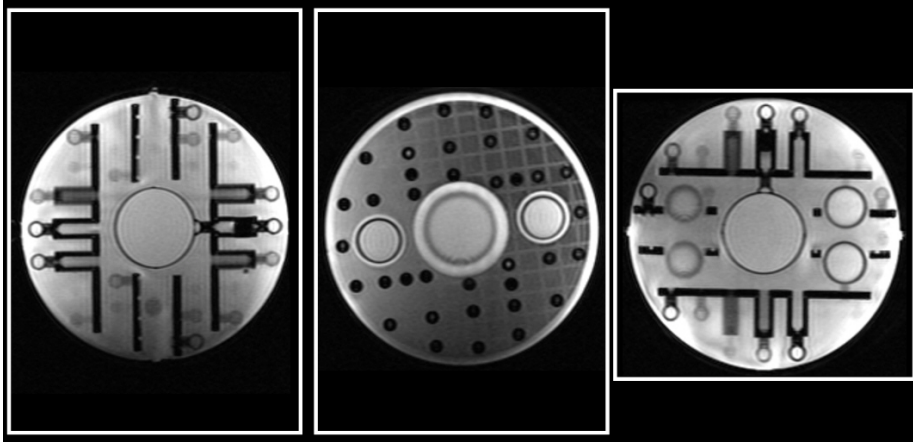
Scan the phantom using the entire electronically loaded ADNI-GO QC Phantom protocol.

Phantom Scan Protocol:

- 1) Localizer
 - 1a) Calibration/Reference Scan (if applicable))
- 2) QC Phantom MP-RAGE/IR-SPGR (Accelerated)
- 3) QC Phantom fMRI (Philips Systems)

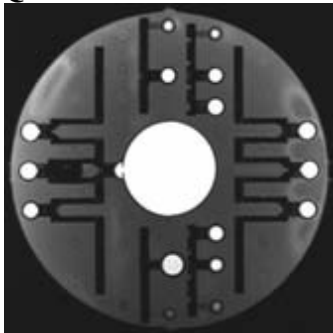
1. Localizer

3 Plane Localizer.



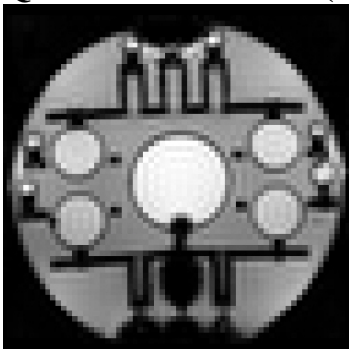
Example – Place FOV to cover entire phantom.

2. QC Phantom MP-RAGE/IR-SPGR (Accelerated)



Example

3. QC Phantom fMRI (Philips Systems)



Data Transfer:

Please upload all the sequences acquired for the phantom scan to the LONI website as detailed in Appendix 6.

Phantom Naming:

1. ADNI Phantom Naming Convention (*entered during LONI upload*):

For the upload to LONI, phantom scans should follow the naming convention:

XXX_P_YYYY

X=Site#/P=Phantom/Y=Phantom#

For example, each phantom scan from site 007 should be coded:

007_P_9999

2. De-identification

As part of the upload process to LONI, all the information entered into the scanner will be removed and replaced with the information entered during the LONI upload procedure. For this reason, you are encouraged to enter the phantom scan information into the scanner following standard local practice.

Phantom Scan Results:

Mayo QC will examine the phantom data and determine if the correct parameters have been met and assure there are no other underlying problems with the scanning session. When finished, an email will be sent to your site notifying you of the results.

C. Human Volunteer Scan Instructions

1. ***After*** your site has received institutional IRB approval for the ADNI2 protocol, A human volunteer must be scanned using the electronically loaded ADNI-GO protocol at 3T.
2. The volunteer should be consented by the study coordinator.
3. Since the data will be de-identified during the upload process to LONI, please enter the volunteer's information into the scanner following standard local practice.
4. Please scan the volunteer using the instructions outlined in "MRI Pre-Scan Procedures" addressed on page 14 of this manual. It is crucial to follow the appropriate pre-scan procedures, subject positioning guidelines, and ADNI-GO sequences.

Human Scan Protocol:

*(All scans are performed in straight orthogonal planes -- Sagittal or Axial)
(No manual adjustments should be made to this protocol)*

- 1) Localizer
 - 1a) Calibration/Reference Scan (if applicable)
- 2) Sagittal MP-RAGE/IR-SPGR
- 3) Accelerated Sagittal MP-RAGE/IR-SPGR
- 4) Resting State fMRI (Philips Systems Only) - Subjects should have eyes OPEN.
- 4) Axial T2-FLAIR
- 5) Axial T2-Star
- 6) Axial ASL Perfusion (Siemens Systems Only)
- 6) Axial DTI Scan (GE Systems)

Data Transfer:

Please upload all the sequences acquired for the volunteer scan to the LONI website as detailed in Appendix 6.

Volunteer Naming:**1. ADNI Volunteer Naming Convention: (entered during LONI upload):**

Volunteer scans should follow the naming convention:
XXX_V_1000 (X=Site#/V=Volunteer#/Y=Vol#)

For example, each phantom scan from site 007 should be coded:

007_V_1000

2. **De-identification** - As part of the upload process to LONI, all the information entered into the scanner will be removed and replaced with the information entered during the LONI upload procedure. For this reason, you are encouraged to enter the volunteer scan information into the scanner following standard local practice.

Human Volunteer Scan Results:

The Mayo QC team will perform a quality control check on the volunteer scan data. Mayo QC will determine if the correct parameters have been met and assure there are no other underlying problems seen during the scanning of this session. When finished, an email will be sent to your site notifying you of the results. In addition, a email will be sent to the selected contact list for your site notifying them your site has been approved and is ready to scan subjects.

Anticipation of Hardware Upgrades:

The Mayo QC team requires notification prior to any software and/or hardware upgrades for any scanner involved in the ADNI imaging study.

ADNIMRI@Mayo.edu

Depending on the impact of the upgrade the site may be required to scan a phantom and/or volunteer prior to continued scanning.

IV. MRI Subject Pre-Scan Procedures

A. Subject Pre-screening

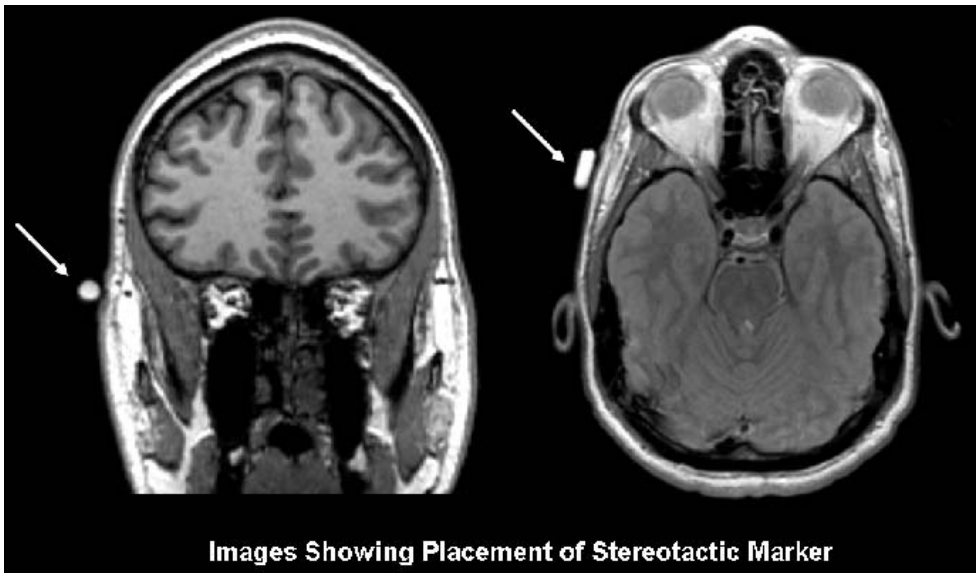
1. All subjects should have been screened by the study coordinator for standard MRI contraindications. (A copy of the pre-screen form is available in Appendix 1) However, subjects must be screened for MRI contraindications immediately before the MRI scan using your local standard protocol. Contraindications include, but are not limited to:
 - The presence of non-removable ferrous metal objects
 - Aneurysm clips
 - Pacemakers
 - Other contraindications such as defibrillators, etc.
2. Sedation during the Screening MRI scan is not offered for this protocol. Subjects that are uncomfortable with MRI scans should not be included in this study. If you have a subject who is uncomfortable with MRI and refuses to complete the scan without sedation, please contact the referring center and notify the study coordinator. Exceptions may be granted on a case-by-case basis to allow the use of sedatives for MR scans at visits **after** screening.

B. Subject Safety and Monitoring

1. All sites should follow the standard subject consent protocols as approved by your local IRB. Explain the scan procedure to the subject so that they know what to expect during the MRI.
2. Provide the subject with the opportunity to use the restroom before the scan begins.
3. Please use universal MRI safety precautions. Make sure that subject does not have any large ferrous metal on or inside of him/her such as shrapnel, a metal fragment in the eye, aneurysm clips, ear implants, spinal nerve stimulators, permanent makeup, or a pacemaker. Make sure that all loose metal objects are removed (Please refer to Appendix 1 Pre-Screening Form).
4. Please use standard local practice for monitoring the subject during the scan. These may include devices to monitor pulse and O₂ levels.

C. Subject Positioning

1. Proper subject positioning is crucial for successful reproduction of serial MRI exams. Therefore, it is important that each subject is positioned in the same manner for each and every MRI exam.
2. Please follow the procedures below for positioning the subject in the head coil:
 - Place clean sheet on scanner table and coil cradle.
 - Besides standard room exclusions ensure the subject has removed their dentures as well as any hair clips, combs, earrings, necklaces, etc.
 - Remove all upper body clothing with metallic trim, such as zippers, buttons or embroideries that may cause artifacts in the MRI images.
 - **Tape stereotactic marker (vitamin E or fish oil capsule) on the subjects' right temple (RT).**



- Provide each subject with ear protection.
- Position the subject so their head and neck are relaxed, but without rotation in either plane. Proper placement in the head coil is crucial because scans are acquired straight, not in an oblique orientation. The subject should also be well supported in the head coil to minimize movement. Motion artifacts may result in data rejection and request for a re-scan in many cases.

- Support under the back and/or legs can help to decrease strain on the knees and back as well as assisting in the stabilization of motion in the lower body.
- Once subject has been positioned, place sponges along the sides of head and a Velcro strap across forehead (if available) for stabilizing support and reduction of motion.
- **Align the centering crosshairs on the subject's nasion (*directly between the eyebrows*) at every scanning session.**

Please Note:

- It is extremely important that the subject is positioned in the same manner, at the nasion, for the Screening MRI exam and for all the subsequent MRI visits.
- It is imperative that the subject positioning procedures are followed exactly for all follow-up exams for a particular subject to ensure consistent imaging of the brain.
- If a deviation from these instructions is required to accommodate a subject, the MRI technologist must note this on the MRI Scan Form and refer to these notes during the follow-up exam.

- Center the head coil over the subject's head, making sure the subject is high enough in the coil to prevent signal loss at the inferior aspect of the brain.
- Offer each subject a panic button in case of emergencies or claustrophobia if common local practice at your facility (for example, a squeeze ball alarm.)
- Remind subject to hold as still as possible and advance subject to the iso-center of the scanning bore.

V. MRI Subject Scan Protocol

ADNI Subject Scanning Session Includes:

- 1) Localizer
 - 1a) Calibration/Reference Scan (if applicable)
- 2) Sagittal MPRAGE/IR-SPGR
- 3) Accelerated Sagittal MP-RAGE/IR-SPGR
- 4) Resting State fMRI (Philips Systems Only) - Subjects should have eyes OPEN.
- 4) Axial T2-FLAIR
- 5) Axial T2-Star
- 6) Axial ASL Perfusion (Siemens Systems Only) - Subjects should have eyes OPEN
- 6) Axial DTI Scan (GE Systems)

Then following the subject scan, please scan the ADNI Phantom as a new exam:

- Localizer Scan (20 secs)
- QC Phantom MPRAGE (Accelerated) (5-8 mins)
- QC Phantom fMRI (Philips Systems Only)

The Mayo QC team will check all imaging parameters to assure the correct sequence was used. If the electronically loaded ADNI-GO sequence is not used to scan a subject, the scan will be excluded and the subject must be re-scanned with the correct ADNI sequences.

A. MRI Scan Information Form

1. The “MRI Scan Information Form” should be completed at the time of acquisition for every ADNI2 subject. A copy of the MRI worksheet is included in Appendix 2.
2. The study coordinator at the referral site should complete the top section of the MRI Scan Worksheet. If this section is incomplete, please contact the study coordinator for the information.
3. The MRI technologist should complete the remainder of the form during the scan. Please be sure to indicate if each sequence has been completed and note any problems or modifications to the protocol in the appropriate sections. Also, note if data transfer, archive, and local copy for clinical reads have been completed.
4. Please complete the form in full and transfer to the study coordinator at the referral site. The study coordinator will upload the information into the ADNI2

database and this will be linked with the subjects' MRI data. Please keep a copy on site for your records.

5. To report an incident regarding the MRI sequences please email:
ADNIMRI@mayo.edu
6. To report an incident about a specific subject please contact your study coordinator.

B. Entering Subject Information

1. Please enter the subject's information into the scanner following your standard local practice. This will assure the scan is formatted for your local archival system. When data are uploaded to LONI the scan header will be de-identified and rendered HIPAA compliant. Data will be identified at the LONI site by subject code only. The subject code will be entered manually at the time of data transmission to LONI.

C. Scanning Sequences:

#1: 3 Plane Localizer:

1. A quick acquisition in 3 orthogonal planes for anatomical orientation. Multiple slices acquired in the middle of each plane (sagittal, coronal, transverse). The head should be centered laterally along the inter-hemispheric fissure and centered on the thalamus for the anterior/posterior and superior/inferior planes. Please use the images below as reference when determining if the subject is positioned properly.
2. Proper placement in the head coil is crucial because scans are acquired in straight orthogonal planes. (Oblique scans are not allowed).
3. If the subject is not positioned properly please adjust the subject in the head coil and re-scout. Continue repositioning and scouting until the subject is correctly centered in the head coil.

Example:

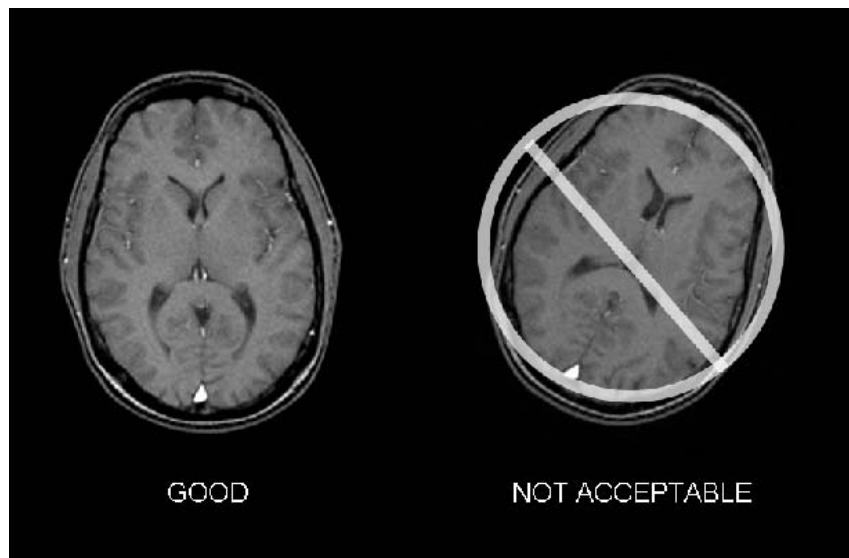


Box A – Axial image. FOV placed in center to avoid side-to-side wrap.

Box B – Sagittal image. FOV placed anterior to avoid nose wrap.

Box C – Coronal image. FOV placed to assure top of the brain is covered.

Make sure subject is aligned correctly in the head coil and is not rotated. Their head should be as straight as possible in the coil. Please adjust the subject if necessary.



The head should be centered laterally along the inter-hemispheric fissure.

Proper placement in the head coil is crucial because scans are acquired straight, not in an oblique orientation.

Please Note:

- It is mandatory that the ADNI-GO acquisition protocols electronically imported to your MRI be used for all sequences at the Screening MRI exam and for all the subsequent MRI visits unless otherwise directed by the coordinating center.
- Failure to use the same sequence at the time of Screening and all subsequent visits will result in the request for a rescan of the subject.
- It is mandatory that the ADNI2 qualified scanner be used for all **new subjects** in the ADNI2 study.
- Failure to use the ADNI2 qualified scanner for all **new subjects** in the ADNI2 Study will result in the request for a rescan of the subject.
- CN and MCI subjects carried forward from ADNI1 are scanned with the **original ADNI protocol on the existing ADNI 1.5T scanner** at that site in order to maintain optimum longitudinal consistency unless and until a decision is made by the MRI Core that the site should perform 3T MRI scans on all subjects.

#1a: Calibration/Reference Scan (If applicable)

MRI scanners provide automated adjustment procedures Calibration/RF coil tuning and frequency adjustments after the subject is positioned in the magnet. Follow the adjustment procedures provided by your manufacturer.

#2: 3D MP-RAGE/IR-SPGR

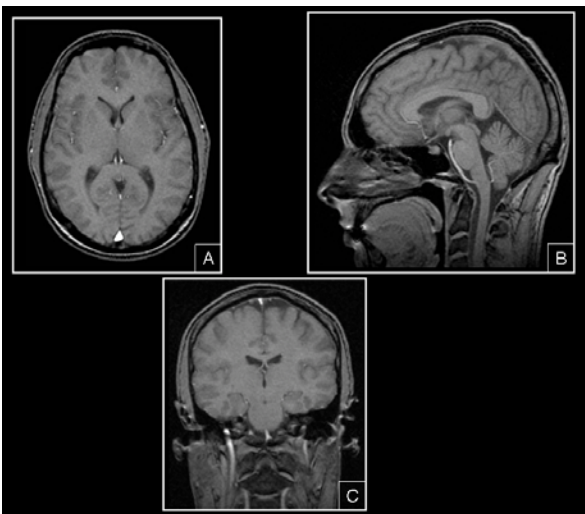
MP-RAGE = Siemens/Philips – IR-SPGR=GE

Example:



1. Orientation. **Straight** sagittal. Slices will be prescribed from left to right. **DO NOT** oblique the scanning FOV to compensate for subject held tilt.
2. Positioning:
Use the tri-planar scout to position the acquisition box. Make sure to get full head coverage. **Studies that do not contain the whole brain and skull cannot be processed.** The skull must be fully included superiorly and laterally. The entire cerebellum should be included inferiorly. **In the anterior/posterior plane the nose should also be included otherwise image folding into the back of the brain will result and the exam may not be usable for the study.** Please see the images below and use as a guide to correctly position the acquisition box.

Example of 3 Plane Localizer for MP-RAGE FOV Placements



A – Axial image. FOV placed in center to avoid side-to-side wrap.

B – Sagittal image. FOV placed anterior to avoid nose wrap.

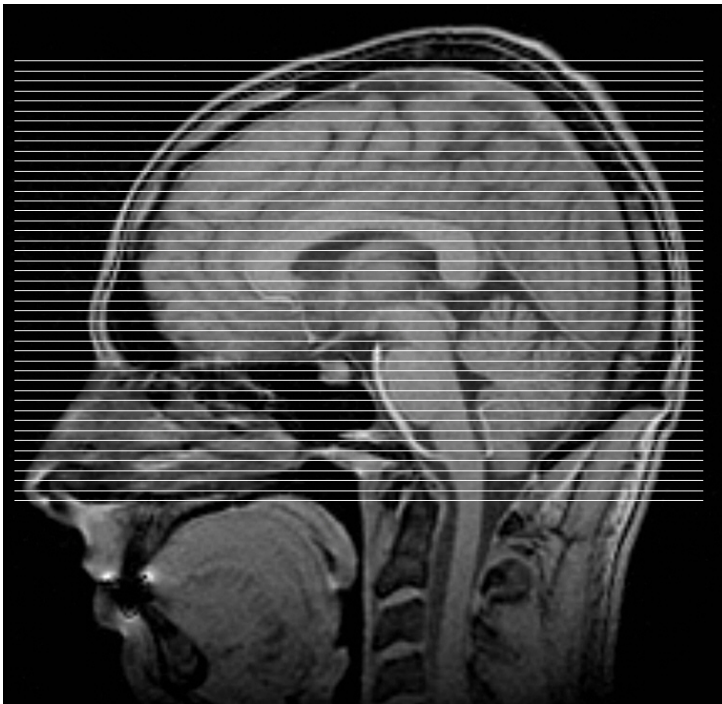
C – Coronal image. FOV placed to assure top of the brain is covered.

#3: Accelerated 3D MP-RAGE/IR-SPGR

For every ADNI2 3T exam, the sagittal MP-RAGE/IR-SPGR sequence is acquired a second time with an acceleration factor. Unless indicated, the scan prescription should be identical as the un-accelerated scan.

Positioning for all Axial Scans:

1. Orientation: **Straight** Axial. Prescribe slices inferior to superior. **DO NOT** Oblique Scans.
2. Positioning: Position on mid-sagittal slice from tri-planar scout. Make sure to get full BRAIN coverage whenever possible. The acquisition stack should be placed just above the most superior point in the brain and should fully cover the cerebellum as well as all brain in the lateral and the anterior to posterior planes. If extra transverse slices are required to achieve this coverage please acquire those slices.

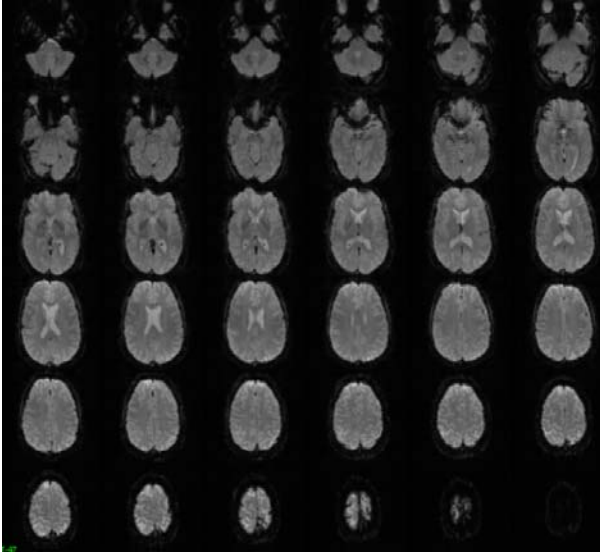


** ***DO NOT*** oblique the scanning slices to compensate for subject held tilt. Scan as straight Axials.

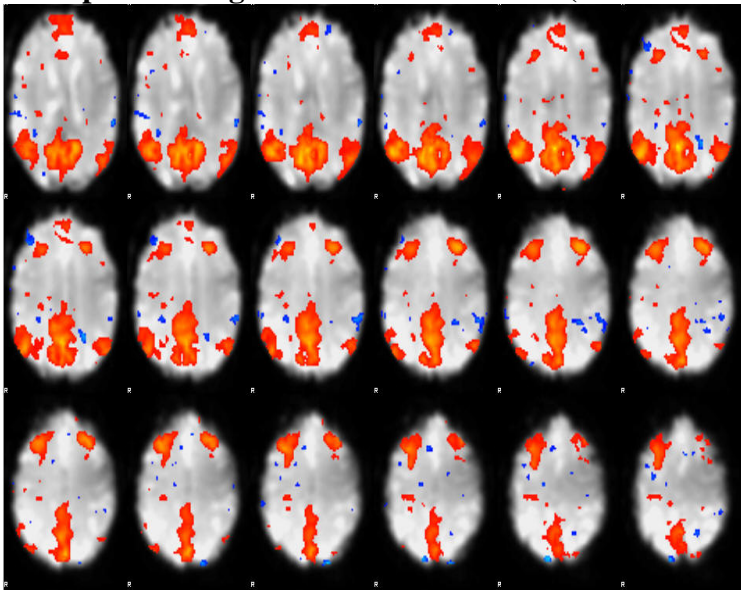
#4: Axial Resting State fMRI – Philips Systems Only

(Subject should have eyes OPEN)

Example: Raw fMRI Images



Example: Resting State Default Network (Post Processed Image)

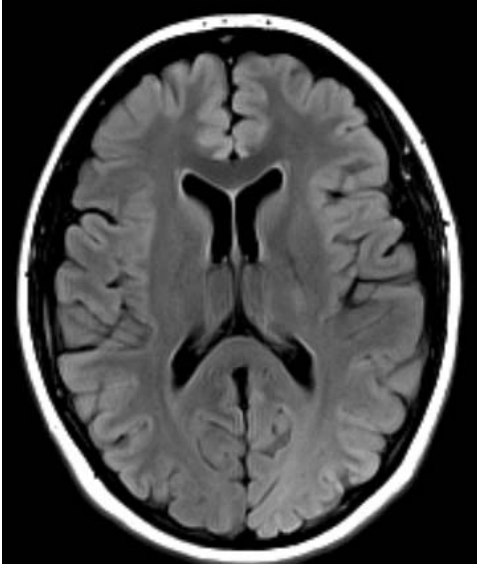


1. Orientation: Straight Axial -- DO NOT Oblique Scans.
2. Subject Instruction: **Please instruct the subject to keep their eyes open during the entire scan.** You can instruct them to focus on a point on the mirror or scanner. Also remind the subjects of the importance of holding their head still for the entire scan.

3. Positioning: Position on mid-sagittal slice from tri-planar scout. **The acquisition stack should be placed just above the most superior point in the brain and should cover the cerebellum if possible.**

#4: Axial T2-FLAIR

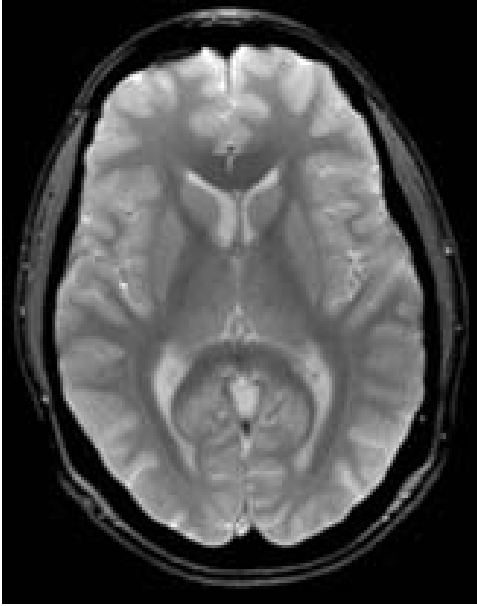
Example:



Orientation: Straight Axial. Prescribe slices inferior to superior. **** DO NOT oblique the scanning slices to compensate for subject held tilt. Scan as straight Axials. If extra transverse slices are required to achieve this coverage please acquire those slices.**

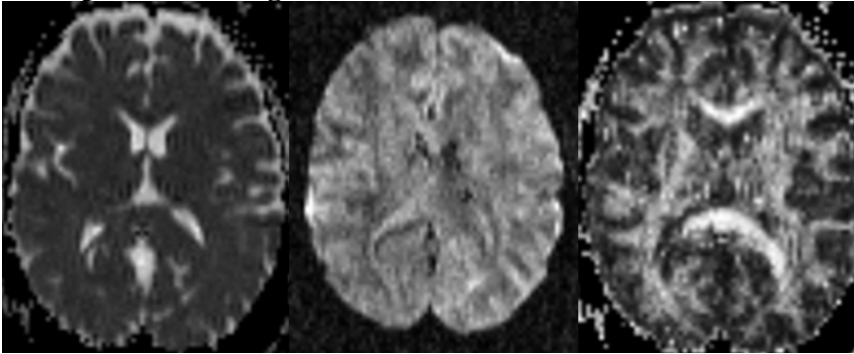
#5: Axial T2-Star

Example:

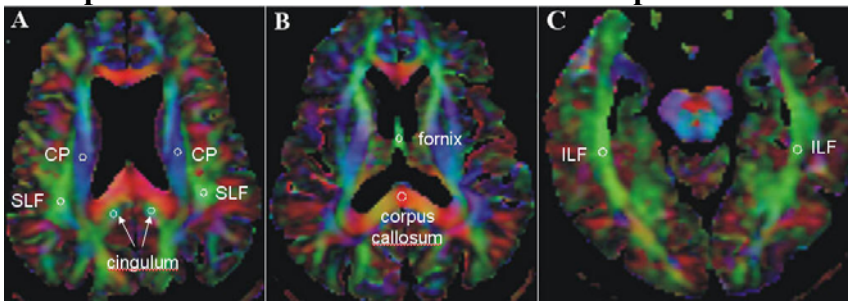


Orientation: Straight Axial. Prescribe slices inferior to superior. ** DO NOT oblique the scanning slices to compensate for subject held tilt. Scan as straight Axials. If extra transverse slices are required to achieve this coverage please acquire those slices.

#6: Axial DTI (Diffusion Tensor Imaging) – GE Systems Only
Example: Raw Images



Example: Post Processed Color Coded FA Maps



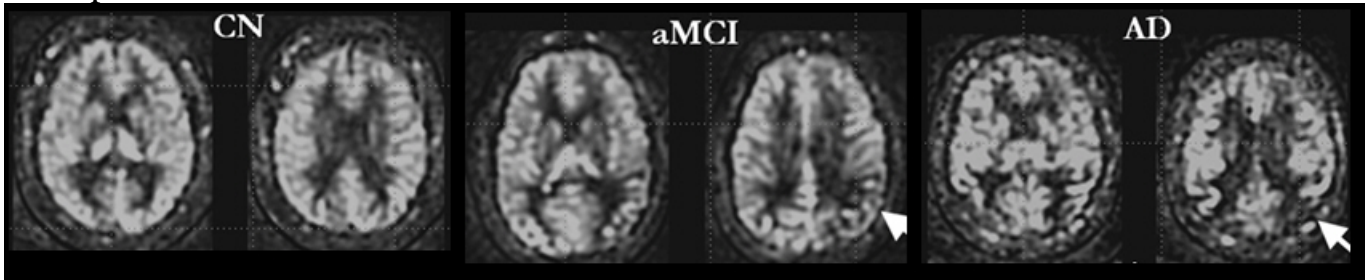
From Kantarci et al, submitted

Orientation: Straight Axial. Prescribe the 3D Slab inferior to superior. **** DO NOT oblique the slab to compensate for subject held tilt. Scan as straight axial.**



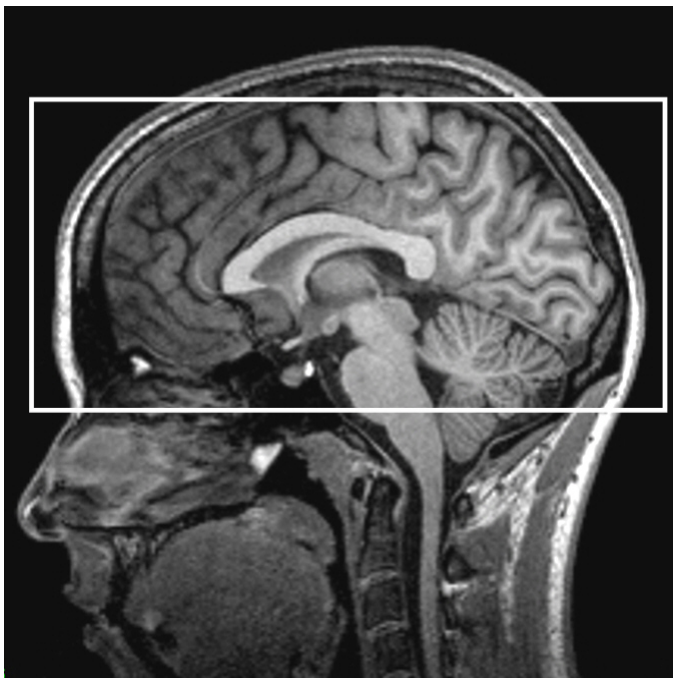
#6: Axial ASL (Arterial Spin Label) – Siemens Systems Only -- Subjects should have eyes OPEN.

Example:



From Vemuri et al, submitted

Orientation: Straight Axial. Prescribe the 3D Slab inferior to superior. **** DO NOT oblique the slab to compensate for subject held tilt. Scan as straight axial.**



VI. MRI Subject Scan Procedures

A. Scan Discontinuation

1. If the subject elects to discontinue the MRI because of discomfort every effort should be made to adjust the table, head coil, etc. and finish acquiring the scan. However, if the subject still does not want to complete the scan, then the MRI should be abandoned and noted as incomplete on the ADNI2 3T MRI Scan Worksheet. The comments sections should include the reason the subject was unable to complete the MRI.

B. Clinical Reads

1. **Every subject in the ADNI2 Study *must* receive a clinical read by an on-site radiologist at each MRI facility.** The clinical read should follow standard local practice and a clinical dictation of the read should be transferred to the study coordinator at the referral site.
2. Clinical reads will **NOT** be provided by Mayo QC or LONI.

C. Archive Procedures

1. Every MRI (both human and phantom) for the ADNI2 Study must be archived at the MRI facility following standard local practice in addition to the data transfer to LONI immediately after the MRI scan. Additional data transfers or copies will be requested by the coordinating center in the event that a data transfer is interrupted or incomplete. Possible MRI archive mediums include:
 - Optical Disk
 - PACS
 - CD or DVD

D. Request for Repeat MRI Scans

1. Reasons for MRI Repeats:
 - a. A request for a repeat MRI may be required in the event that the scans are found to be unacceptable due to subject motion or an incomplete MRI acquisition. Your site will be asked to schedule a repeat study.
 - b. Mayo QC will check all ADNI 2 scans for protocol compliance. Repeat exams may also be required if the incorrect scan sequence, orientation, or angulations are used. It is imperative to use the ADNI-GO approved

acquisition sequence with every ADNI2 subject (unless continuing CN or MCI from ADNI1, such subjects continue with the original ADNI sequence on the 1.5T). Scans with image degradation due to the incorrect scan sequence, orientation, or angulations will **NOT** be reimbursed. Re-scans will be reimbursed if the correct scan sequence, orientation, and angulations were used.

2. Procedures for MRI Repeats:

- a. Repeat MRI scans should be performed as quickly as possible. The coordinating center for the ADNI2 Study will contact the referral site as well as the MRI facility requesting a repeat MRI. Detailed information regarding the reason for the repeat as well as suggestions for improvement will be communicated to both sites.

VII. On Going Quality Control and Post-Subject Phantom Scanning Instructions

To ensure scanner stability and scan quality throughout the ADNI2 Study, each site is **required** to perform *on going* quality control scans on the ADNI phantom using the ADNI-GO QC Phantom protocol each day a subject is scanned. If multiple subjects are scanned on a single day, only one phantom scan needs to be acquired

IMPORTANT: If a site fails to perform these phantom scans and they have not been performed within 24 hours, ADNI will not reimburse the subject scan until received.

A. On Going Quality Control (QC) Phantom Scanning Instructions

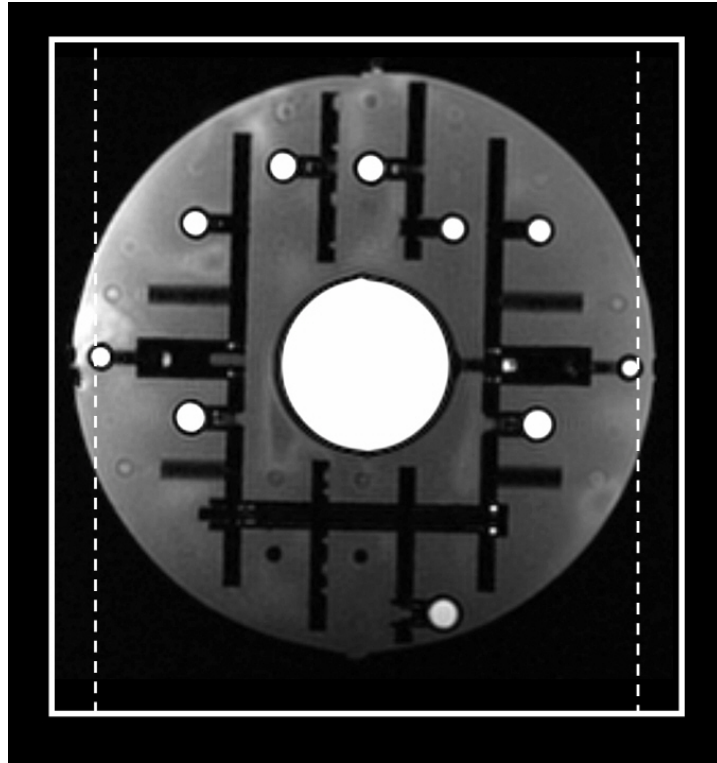
For on-going quality control and post processing image analysis, each site must scan the specially designed ADNI phantom using the electronically loaded ADNI-GO QC protocols **each day a subject is scanned.**

On Going QC Phantom Scan Protocol:

Phantom Scan Protocol:

- 1) Localizer
 - 1a) Calibration/Reference Scan (if applicable))
- 2) QC Phantom MP-RAGE/IR-SPGR (Accelerated)
- 3) QC Phantom fMRI (Philips Systems)

1. On the day a subject(s) scan(s) is completed, register the phantom as a new exam. (Start a new exam)
2. **3 Plane Localizer** - Please run a localizer to be sure the phantom is positioned correctly in the head coil.
3. **QC Phantom Sagittal MP-RAGE/IR-SPGR** - The on-going quality control scans are identical to the subject 3D scans except the slice thickness has been increase to ensure that the phantom has been covered completely. Please refer to the following figure.



Note that the dotted line shows original slice thickness of 1.2 and solid line represents thickness of 1.3, which is adequate for covering entire phantom.

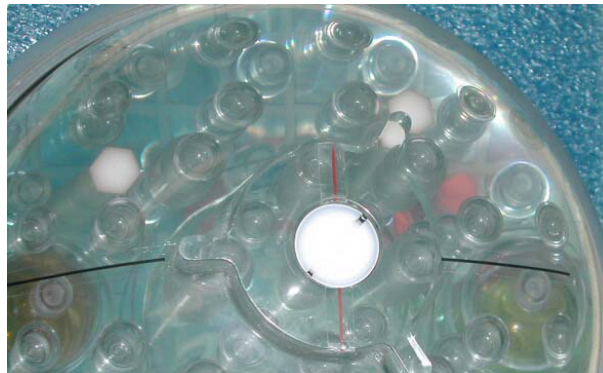
Phantom Positioning:

The following image shows the phantom placed in the appropriate position within the 8-channel coil. Achieving a reproducible position is a key element to the system performance analysis that will be conducted each day an ADNI2 subject(s) is imaged. Positioning with the alignment lines upward and the serial number SN XXXX positioned out of the bore as shown, will facilitate the reproducible positioning of your phantom.



coil.

Please note that your phantom has a base and positioning markers (in black and red, see image below). The phantom should be placed inside the head coil with the alignment markers facing upwards. This orientation is due to space constraints within some coils and we would like to maintain a consistent orientation for all scanners across the ADNI2 study.



The top of the phantom and the alignment lines are indicated above. These markings should be used with the alignment lights on your scanner to position the phantom.

Please place the phantom in your head coil with the alignment markers up, and the phantom SN number (e.g. 9999) facing you, out of the bore (see the following picture). Furthermore, try to align the center of the phantom with the center of the coil. Use the alignment lights on your scanner to position the phantom into the center of the magnet.



The phantom is shown in the correct position, with the Serial Number (SN 9999) positioned forward and reading correctly from right to left. This will be the typical scanning position for your phantom

Phantom Storage:

Due to its small base, please store your phantom in the wooden box that it came in. This will ensure that the phantom does not roll off its base and fall when it is not being used.



B. Phantom Naming:

1. ADNI Phantom Naming Convention (*entered during LONI upload*):

For the upload to LONI, phantom scans should follow the naming convention:

XXX_P_YYYY

X=Site#/P=Phantom/Y=Phantom#

For example, each phantom scan from site 007 should be coded:

007_P_9999

2. **De-identification** - As part of the upload process to LONI, all the information entered into the scanner will be removed and replaced with the information entered during the LONI upload procedure. For this reason, you are encouraged to enter the phantom scan information into the scanner following standard local practice.

C. Data Transfer:

Each site will send the phantom data (along with the subject data) to LONI within 24 hours after the completion of the scan as detailed in Appendix 6.

D. Measurements:

The Mayo QC team will perform the following measurements on the phantom data: Gradient Linearity Measurements, Signal to Noise measurements, Image contrast, Inhomogeneity, and RF Power measurements.

E. Phantom Results and Site Notification:

Mayo QC will examine each phantom data set to ensure that there are no underlying problems with the scanning session, and that the scanner has not drifted out of specification. When finished, if there is an issue that needs to be addressed, an email will be sent to your site notifying you of the problem.

VIII. Appendices

Appendix 1: MRI Pre-Screening Form

The following is an example of the form subjects complete with the study coordinator prior to their MRI scans. The study coordinator should notify the MRI site if the subject has indicated yes for any items that may pose a risk to the subject (i.e. internal metal) during the MRI. This form should not be a substitute for your standard pre-screening form.

Date ____/____/____

Subject ID _____

Please check Yes/No for each of the following:

Yes No Previous MRI scan

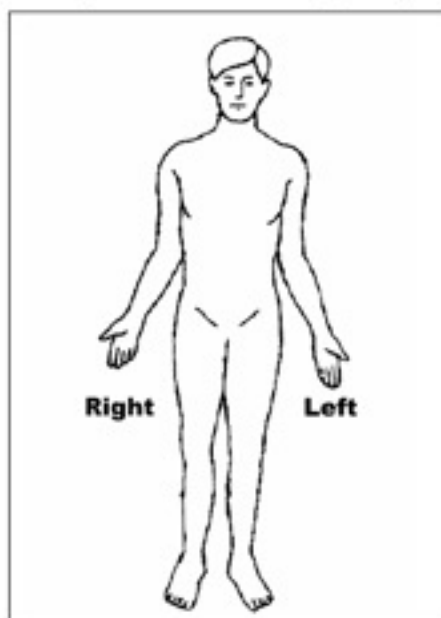
Exclusionary Items:

- Yes No Cardiac pacemaker / defibrillator
 Yes No Aneurysm or aortic clip(s)
 Yes No Neurostimulator
 Yes No Cochlear, otologic, or ear implant

Please Inform MRI Center:

- Yes No Prosthesis or implant
 Yes No Artificial limb or joint
 Yes No Insulin or infusion pump
 Yes No Bone growth / fusion stimulator
 Yes No Carotid artery vascular clamp
 Yes No Electrodes (on body, head, or brain)
 Yes No Stents, filters, or coils (intravascular)
 Yes No Shunt (spinal or intraventricular)
 Yes No Vascular access port and / or catheter
 Yes No Tattooed makeup (eyeliner, lips, etc.)
 Yes No Body piercing(s)
 Yes No Any metal fragments or shrapnel (current or removed)
 Yes No Internal pacing wires
 Yes No Metal or wire mesh implants
 Yes No Bone / joint pin, screw nail, wire, plate
 Yes No Breathing disorder
 Yes No Claustrophobia
 Yes No Hearing aid (*Remove before MRI*)
 Yes No Dentures (*Remove before MRI*)

Please mark on the figure below the location of any implant or metal inside or on your body



Remove all metallic objects prior to your MRI examination

If answers below are yes, please explain below

- Yes No Worked extensively with metal (grinding, etc.)
 Yes No A history of seizures continuing to present

Explanation _____

Signature of subject or subject's representative

Name of Representative

Signature of person administering screening form

Date ____/____/____

Date ____/____/____

Appendix 2: MRI Scan Information Form

- The “MRI Scan Information Form” should be completed at the time of acquisition for every ADNI2 subject. A copy of the MRI worksheet follows.
- The study coordinator at the referral site should complete the top section of the form. If this section is incomplete, please contact the study coordinator for the information.
- The MRI technologist should complete the remainder of the form during the scan. Please be sure to indicate if each sequence has been completed and note any problems or modifications to the protocol in the appropriate sections. Also, note if data transfer, archive, and local copy for clinical reads have also been completed.
- Please complete the form in full and transfer to the study coordinator at the referral site. Please keep a copy on site for your records.

Autism's Power Cooperative Study
ADCS
3T MRI Scan information
 Page 1 of 4

ADCS PARTICIPANT NUMBER [][]-[][]-[][][][]
WASH STATE ID # ADG [][]
DATE OF BIRTH [][]/[][]/[][][][]

To be completed by Study Coordinator
 Study Coordinator Name: [][][][][][][][]
 Telephone #: [][][][][][][][]
 ADG Participant initials: [][]

Scheduled Date: [][]/[][]/[][][][]

To be completed by MRI Technologist if scan does not complete please contact study coordinator for participant information:

NOTE: Every set should save ORIGINAL scan data unless before any rescans data is entered.

Was the scan conducted? Yes No

If No, please provide reason why the scan was not conducted:
 Illness Participant unavailable Participant unwilling Administrative problems
 Withdrawal consent Other (specify): _____

Important: It is mandatory that the ADG 1 be a qualified examiner used for ALL participants in the ADG 1 study. It is also mandatory that the same approved sequence form ADG 1 GO are used at all ADG 2 scans. Do NOT adjust protocol values.

VRI Operator Initials: [][] Scan Date: [][]/[][]/[][][][]

Scanner Manufacturer Siemens Philips GE

Was sodium medication consumed for use during MRI scan? (Sodium medication is not allowed or screen.)
 Yes No

Please follow instructions in the ADG 1 Technical Manual for positioning the participant in the head coil.
 Placed Stereotactic Marker on the participant's IRT template? Yes No

Scan #1: Planar/hi-Planar Scout (If eval able, otherwise use an axial scout) (Check participant positioning in the head coil, repetition and an-ang if necessary)
 Scout Completed? Yes No
 Comments: _____

Scan #2: Straight Sagittal 3D MP-RAGE/18-SPGR DO NOT oblique the scanning PCP to accommodate for participant head tilt. Position PCP to extend across topography of the back of the head.
 MP-RAGE - Completed? Yes No
 Comments: _____



3T MRI Scan Information

Page 2 of 4

ADHD INFORMATION NUMBER

			S			
--	--	--	---	--	--	--

Scan #1: Sagittal 3D Annotated MP-RAGE/IR-AP/IR *Please wear an eye cover* cover postures the non-annotated scan unless posturing is necessary.*

Repeat MP-RAGE - Completed? Yes No

Comments:

Complete only for Philips Systems:

Scan #4: Axial Resting State fMRI (Participant should have eyes OPEN)

None/Probe

Was the participant instructed to open their eyes? Yes No

Did the participant keep their eyes open? (MRI Tech ask the participant right after the scan) Yes No

The eye pads should be placed just above the most superior part of the brows and should cover as much as possible, if the cornea is not covered fully, that is acceptable. Instruct the participant prior to the scan that they should keep their eyes open and to hold very still. DO NOT oblige the scanning sites.

fMRI Completed? Yes No

Comments:

Scan #8: Axial FLAIR

Participant to cover their cornea through the top of the head. DO NOT oblige to the scanning sites.

FLAIR Completed? Yes No

Comments:

Scan #9: Axial T2 Star

Participant to cover their cornea through the top of the head. DO NOT oblige to the scanning sites.

T2 Star Completed? Yes No

Comments:



3T MRI Scan Information

Page 3 of 6

ADNI 1/04/2011 09:01:01 AM EDT

□ □ □ 3 □ □ □ □

Siemens Systems Only (with license agreement)

Scan #6: Axial ASL Perfusion Scan (Participant should have eyes OPEN)

Siemens Systems Only (with license agreement) Position Slices to cover below-amblyon through the top of the head. **DO NOT** oblique the scanning slices.

Note license

Was the participant instructed to open their eyes? Yes No

Did the participant keep their eyes open? (MRI Tech ask the participant right after the scan)

Yes No

ASL Completed? Yes No

Comments:

GE Systems Only (with license agreement)

Scan #6: Axial DTI Scan

GE Systems Only (with license agreement) Position Slices to cover below-amblyon through the top of the head. **DO NOT** oblique the scanning slices.

Note GE system

DTI Completed? Yes No

Comments:

Scan #7: Phantom QC Scan(s): Position slices to completely cover the phantom. **DO NOT** oblique the scanning slices. ADNI 2 phantom scan is required on the day of the ADNI 2 participant scan (only one phantom scan is needed even if there are multiple participants scanned on a single day.)

Phantom Completed? Yes No (if 'No, Why not?)

Comments:

Participant Motion Problems? Yes No

Comments:



3T MRI Scan Information

Page 6 of 4

ADCS PROTOCOL NUMBER

□ □ □ □ **8** □ □ □ □ □ □

Scanner Malfunction Yes No

Comments

Other Protocol Variations Yes No

Comments

Was data transferred to LONI within 24 hours of scan?

- Yes
- No

Transfer Date:

MM	DD	YY	MM	DD	YY

Comments

Data Archived Locally? (If No please explain under comments)

- Yes
- No

Archive Location:

- HCS
- CDRIB
- NDD
- Other

- No

Comments

Was a Lumbar Puncture completed prior to the MRI scan? (To be completed by the Study Coordinator)

- Yes No

If Yes, What was the interval between LP and MRI?

- | | | |
|--|--------------------------------------|---|
| <input type="checkbox"/> less than 6 hours | <input type="checkbox"/> 12-24 hours | <input type="checkbox"/> 49-72 hours |
| <input type="checkbox"/> 6-12 hours | <input type="checkbox"/> 25-48 hours | <input type="checkbox"/> more than 72 hours |

Appendix 3: MRI Acquisition Summary

Please Note: Your MRI scanner vendor (GE, Siemens, or Phillips) will be supplying electronic protocols (WIPs) for installation to your local service engineer for your specific MRI system(s). This will ensure that you have the correct protocol for your MRI scanner. If you have any questions about this procedure please contact: ADNIMRI@Mayo.edu

Use only the imported ADNI sequences

Additional electronic copies of the ADNI sequences can be found at:
<http://www.loni.ucla.edu/ADNI/Research/Cores/>

ADNI-GO 3T QC Phantom Scan Protocol:

- 1) Localizer
 - 1a) Calibration/Reference Scan (if applicable)
- 2) QC Phantom MP-RAGE/IR-SPGR (Accelerated)
- 3) QC Phantom fMRI (Philips Systems)

ADNI-GO 3T Human Protocol:

*(All scans are performed in straight orthogonal planes -- Sagittal or Axial)
(No manual adjustments should be made to this protocol)*

- 1) Localizer
 - 1a) Calibration/Reference Scan (if applicable)
- 2) Sagittal MP-RAGE/IR-SPGR
- 3) Accelerated Sagittal MP-RAGE/IR-SPGR
- 4) Resting State fMRI (Philips Systems Only)-Subjects should have eyes OPEN.
- 4) Axial T2-FLAIR
- 5) Axial T2-Star
- 6) Axial ASL Perfusion (Siemens Systems) - Subjects should have eyes OPEN.
- 6) Axial DTI Scan (GE Systems)

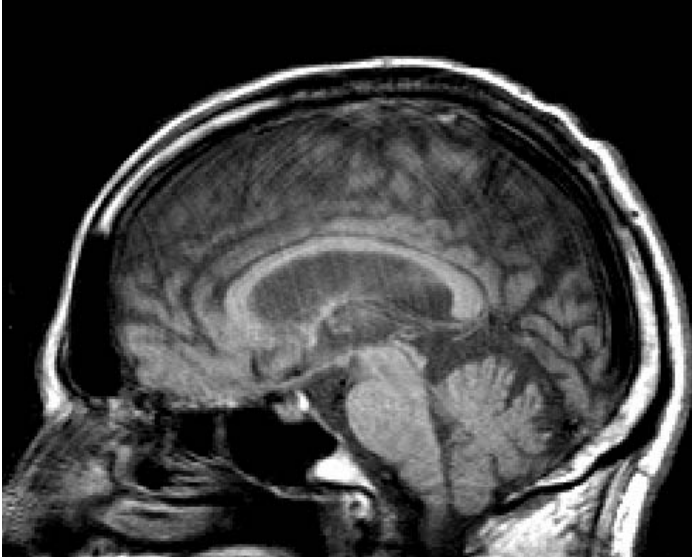
Appendix 4: ADNI Acquisition Troubleshooting Guide

Superior image quality is imperative to the success of the ADNI2 Study. Every effort should be made to acquire excellent scans on ADNI2 subjects at their first MRI appointment and at all subsequent visits. This prevents the clinical centers from rescheduling additional repeat MRI's for study subjects.

It should also be noted that the 3D T1 acquisition sequence is the most important sequence in ADNI2. This sequence should always be acquired immediately after the tri-planar scout. Please note the image quality of this scan and re-acquire if necessary before running the rest of the sequences.

Please use the following reference as a guide for identifying and remedying inferior image quality, image artifacts, and subject issues that may degrade image quality. Also, please contact ADNIMRI@Mayo.edu for specific technical questions or concerns outside the scope of this manual.

Example 1: Image Degradation due to Movement Artifact



Problem:

In this example movement has caused motion artifacts. Acquisitions with major motion artifacts will not be accepted and a repeat scan may be requested.

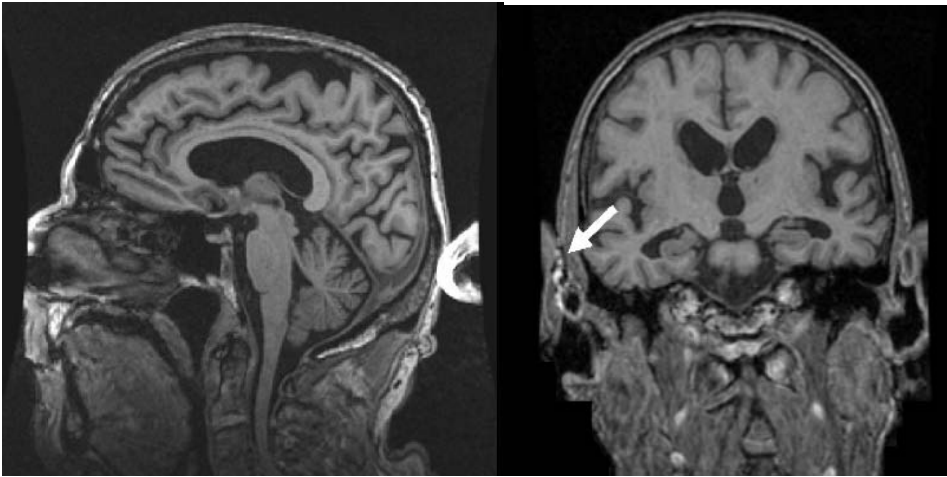
Possible Remedies:

If movement is due to the subject's head moving, reacquire MP-RAGE after tightly securing the subject's head with additional restraints and discussions with subject to hold their head still.

If the subject is not moving it is possible the artifact is the result of mechanical problems.

Please discuss with your service engineer.

Example 2: Wrap Around



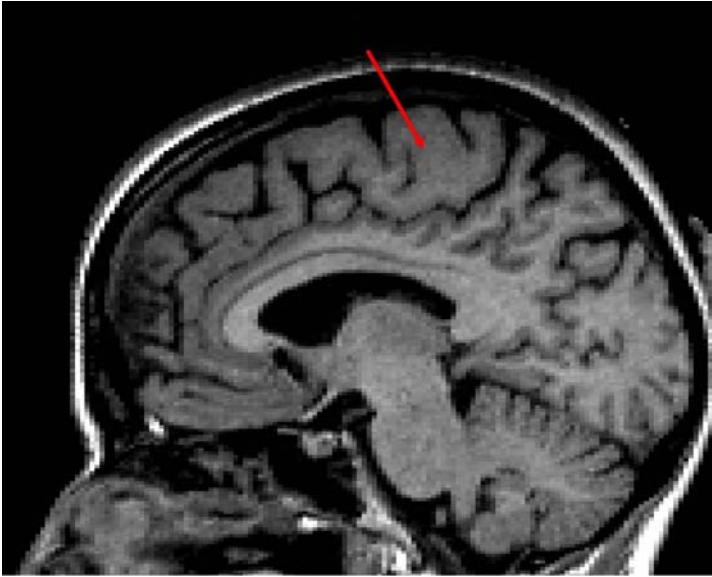
Problem:

In this example, wrap around occurs in the MP-RAGE image above. In the figure on the left, the nose folds into the back of the skull. In the figure on the right, the ear wraps into the side of the skull. Acquisitions with wrap around artifacts will not be accepted and a repeat scan will be requested.

Possible Remedy:

1. Wrap around generally occurs when the subject's head size is larger than the acquisition box. Please try to position the acquisition box so that the wrap can be avoided.

Example 3: Signal Loss at the Top of the Brain



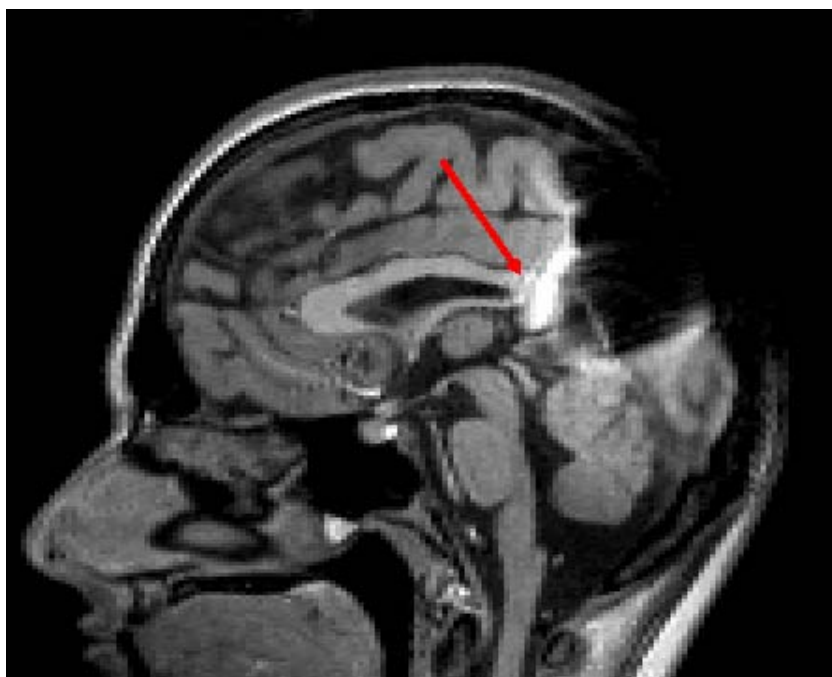
Problem:

In this example, the image has a loss of signal at the top of the brain due to incorrect positioning in the head coil. The subject was placed too high in the coil. Please note the lack of contrast between gray and white matter at the top of the brain only. Acquisitions with signal loss, especially due to incorrect positioning, will not be accepted and a repeat scan will be requested.

Possible Remedies:

1. Check to be sure subject is positioned correctly in the head coil. Please see “Subject Positioning” for information on positioning.
2. Make sure head coil is properly secured.

Example 4: Metal Artifact



Problem:

Magnetic field distortions: In this example there is a signal void due to the presence of metal near the subject's head. Acquisitions with metal artifact will not be accepted any circumstances and a repeat scan will be requested.

Possible Remedy:

1. Make sure the subject is not wearing any metal. Refer to Appendix 1. Check for hair clips, metallic makeup (i.e. permanent eyeliner), necklace, safety pins, removable dentures, and facial jewelry. Remove metal and rescan.

Appendix 5: FAQ's -- Frequently Asked Questions:

Q – My subjects head is tilted quite a bit. Can I oblique the scans then?

A – No, do not oblique the scans, we can deal with the subjects head being tilted more easily than we can with scans that were acquired obliquely.

Q – I forgot to put the marker on the subject. Do we need to rescan?

A – No, that will not be a reason for re-scan, please just try to remember next time.

Q – What is the phantom filled with?

A – Mostly distilled water and some anti mold ingredients. If you notice your water level is getting low, please top off with distilled water. Distilled water acts differently when imaged than tap water, so please make sure you are using distilled water.

Q – Can I scan the phantom in the same exam as the subject?

A – No please, start a new exam and name the phantom with the correct ID. The phantom scans are handled differently than the subject scans. Starting a new exam gives that study a different unique identifier (UID) thus much easier to upload separately and store separately.

Q – I noticed some wrap on my image. Should I increase the FOV to compensate?

A – No, unless the wrap is affecting brain tissue you do not need to re-scan. If the wrap is affecting brain tissue please try to place the FOV to avoid wrap if possible.

Q – Should I append this scan to the previous scan in the PACs system.

N – Please do not append the sessions, it causes the exams all to have the same UID.

Q – Do I need to have the subject remove their dentures?

A – Yes, please have all your subjects remove their dentures to avoid artifact.

Q – I did 3 ADNI2 subjects today. Do I need to scan the phantom 3 times?

A – No you just need to scan the phantom once per day for ADNI2.

Q – I am having trouble with upload data to LONI, who do I contact?

A - adni@loni.ucla.edu

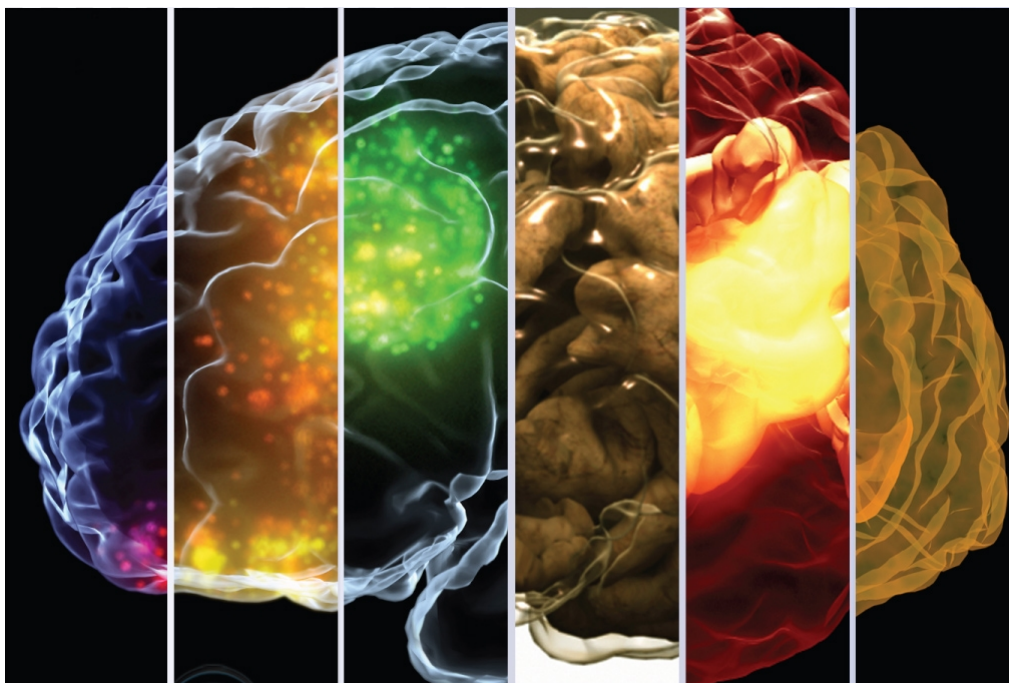
Q – The exam was already sent to LONI, do we need to keep a copy of it?

A – Yes, please keep a copy of all human AND QC phantom scans your site performs.

Q – Our scanner was upgraded, do I need to re-certify?

A – If it was a major upgrade (both software and hardware) the answer is yes. However, many minor upgrades do not need a full re-certification scan, just a phantom scan. In that case, we may just ask you run the QC phantom scans to make sure the pulse sequences are working.

Appendix 6: Data Transfer to LONI



Uploading MRI data to the Laboratory of Neuro Imaging (LONI)

Image Data Archive Instructions

CONTENTS:

- A - [Image Data Archive Overview](#)
- B - [System Requirements](#)
- C - [User Registration](#)
- D - [IDA Log in](#)
- E - [Archive Process Overview](#)
- F - [Archive Instructions](#)
- G - [Archiving Data in Batch](#)

A - IMAGE DATA ARCHIVE OVERVIEW

The LONI Image Data Archive (IDA) provides an integrated environment for safely archiving, querying and visualizing neuroimaging data utilizing a web-browser interface. The archive protects data from unauthorized access while providing the ability to share data among collaborative investigators.

For questions or problems with the IDA please send e-mail to adni@loni.ucla.edu

B - SYSTEM REQUIREMENTS

The IDA system requires a computer with internet access, newer web browser software (IE, Netscape, Mozilla, Safari), Java plug-in (version 1.5 or higher), and a valid user account.

C - USER REGISTRATION

1. Click "**Click here to create an account**" on the Image Data Archive Sign-In page. <https://ida.loni.ucla.edu>

The LONI Image Data Archive (IDA) is a user-friendly environment for archiving, searching, sharing, tracking and disseminating neuroimaging and related clinical data. The IDA is utilized for dozens of neuroimaging research projects across North America and Europe and accommodates MRI, PET, MRA, DTI and other imaging modalities. A flexible data de-identification engine and encrypted file transmission help ensure compliance with patient-privacy regulations. All data are stored on redundant servers with daily and weekly on- and off-site backups.

Archiving data in the IDA is simple, secure and requires no specialized hardware, software or personnel. All that is required is a computer with internet access and web browser software. The IDA automatically extracts relevant metadata from the de-identified image files allowing data to be searched within moments of archival. Once archived, data may be downloaded and/or streamed into the LONI Pipeline processing environment. Integration of the LONI Debabeler file format translation engine allows users to download image data in a number of file formats in addition to the original file format.

Returning Users Sign In

E-mail

Password

[Forgot your password?](#)

[Java Plug-in \(JRE\) is required.](#)

[Click HERE to modify your account.](#)

New Users

[Click HERE to create an account.](#)

Image Data Storage, Protection & Sharing



ABOUT

- Overview

NEWS

- New Features
- Announcements

DOCUMENTATION

- Instructions
- Collaboration
- FAQ

SOFTWARE

- Debabeler
- De-identification Debabeler
- Inspector

DATA

- Stats
- Available Data

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2. Complete the **Create New Account** form then press the **Register** button. A temporary password will be sent to your email address.

Create New Account

SETUP NEW ACCOUNT

Type in your E-mail address*

Type in a user name*

If you have a LONI account use your LONI user name

PERSONAL INFORMATION

First Name*

Last Name*

Institution / Company*

Department

Zip / Postal Code

Country*

If you have a website, please enter the URL here

Required fields are denoted by an asterisk(*)

Once you click Register, we'll send you an e-mail message containing your temporary password. To ensure your temporary password is received, you may need to add dba@loni.ucla.edu to your safe sender list.

BY CONTINUING, YOU ARE AGREEING TO THE [LONI TERMS OF USE](#)

D – IDA LOG IN


From the home page <https://ida.loni.ucla.edu/login.jsp?project=ADNI>, enter your e-mail address and password, then click the Sign-In button. New users, please refer to the user registration section for instructions on how to register for a user account.

1. On the Sign-in page, enter your e-mail address and password.
2. Click **Sign-In**.

ABOUT	NEWS	DOCUMENTATION	SOFTWARE	DATA	LONI Home
-----------------------	----------------------	-------------------------------	--------------------------	----------------------	---------------------------


The LONI Image Data Archive (IDA) is a user-friendly environment for archiving, searching, sharing, tracking and disseminating neuroimaging and related clinical data. The IDA is utilized for dozens of neuroimaging research projects across North America and Europe and accommodates MRI, PET, MRA, DTI and other imaging modalities. A flexible data de-identification engine and encrypted file transmission help ensure compliance with patient-privacy regulations. All data are stored on redundant servers with daily and weekly on- and off-site backups.

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Returning Users Sign In
E-mail
Password
[Forgot your password?](#)
 
[Java Plug-in \(JRE\) is required.](#)
[Click HERE to modify your account.](#)

New Users
[Click HERE to create an account.](#)

Image Data Storage, Protection & Sharing



ABOUT <ul style="list-style-type: none">• Overview	NEWS <ul style="list-style-type: none">• New Features• Announcements	DOCUMENTATION <ul style="list-style-type: none">• Instructions• Collaboration• FAQ	SOFTWARE <ul style="list-style-type: none">• Debabeler• De-identification Debabeler• Inspector	DATA <ul style="list-style-type: none">• Stats• Available Data
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E – ARCHIVE PROCESS OVERVIEW

The two steps that comprise the image archive process are de-identification and file transmission. The image files are de-identified at the user's local workstation, in accordance with HIPAA regulations and ensuring that no identifiable subject information crosses the network. Then, the de-identified files are securely transmitted to LONI and stored in the data archive.

SYSTEM REQUIREMENTS


The IDA system requires a computer with internet access, newer web browser software (IE, Netscape, Mozilla, Safari), Java plug-in (version 1.5 or higher), and a valid user account.

PROCESS

Following user authentication, the user chooses the data to be archived by selecting the directory where the data are located and chooses a directory where the de-identified files will be written. Next, a Java applet de-identifies the files, inserting the user-supplied subject identifier and removing or replacing other potentially identifying information. The user is given the opportunity to validate the de-identification results, prior to transmitting the images. Once the results of the de-identification process have been validated, the files are transmitted from the user's local computer to LONI. Upon arrival at LONI, the data are stored in a fault-tolerant storage area network and the database is populated with relevant metadata attributes.

The archive log in page is available from IDA Home page <https://ida.loni.ucla.edu/login.jsp?project=ADNI>. Enter your e-mail address and password then click the Sign-In button. New users, please refer to the user registration section for instructions on how to register as a user.

On the IDA Menu page, click the **Archive Files** button to upload images to the data archive.

 LONI
Image Data Archive

ABOUT ▾ NEWS ▾ DOCUMENTATION ▾ SOFTWARE ▾ DATA ▾ LONI Home

LONI > Resources > Data

IDA Data Management Menu

LOG OUT

Select an option from the menu below or click Logout to end your session. CURRENT PROJECT: ADNI ▾


Query
Search, find, view and download images.

Perform Simple Searches of the Database

Perform Advanced Searches of the Database

Manage Data Collections: Download, Reorganize, etc.

Archive Files
Upload new images into the Image Data Archive.

 Load Image Data into the Archive

RELATED LINKS

- [DOJ Protection of Human Subjects >](#)
- [DHHS Privacy Rule >](#)
- [LONI De-Identification Policy \(PDF\) >](#)
- [LONI Policy \(PDF\) >](#)

F - ARCHIVE INSTRUCTIONS

The Archive and Review page is the starting point for uploading new images. The bottom portion of the page lists the last images uploaded by the user.

REQUIREMENTS:

- All image files for each subject must be within a single directory tree, which may contain subdirectories.
- The source directory must not contain multiple image formats.
- An empty directory for holding the de-identified files.

DEFINITIONS

- The **Source Directory** is where the original files are located.
- The **Target Directory** is an empty directory, where the new, de-identified files will be written.

NOTES

- The browser window must remain open during the entire upload process.
- Closing the browser window will cancel the upload.
- Compressing files will speed the upload process for computers with slower connections.
- Files being uploaded will not be modified (lossless compression).

On the “Archive and Review” page, select your **Project/Site** from the drop down menu and click the “**Single Archive**” button. Do not open multiple IDA browser windows when archiving data.

LONI
Image Data Archive

ADNI

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LONI > Resources > Data

Archive and Review

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PROJECT INFORMATION:

Select Project:
ADNI@University of California, Los Angeles

ARCHIVE FILES:
The data archival process involves two basic steps:
1. De-identify the header file by replacing any fields that identify the subject, such as Patient Name and ID, and
2. Transmit image data securely from the local site to LONI.

To archive a single study, click the SINGLE ARCHIVE button.

To archive multiple studies in batch mode, click the BATCH ARCHIVE button.

NOTE: Do not open multiple IDA browser windows while archiving data.

VIEW RECENTLY ARCHIVED VOLUMES:
Click on the VIEW button to visualize the volumetric representation of your uploaded files.
Click on the REFRESH button to update the volume list.

SUBJECT ID	SERIES DESCRIPTION	NO OF IMAGES	DATE ▲	View	Download
01_555	SAG MPRAGE 8 CHANNEL	1	Tue, 01/19/2010	VIEW	DOWNLOAD
8596902	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8596702	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8596701	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8595602	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8592950	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8587301	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8066250	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8066201	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8913502	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8897001	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD

Step 1:

Complete the required information on the De-Identify page then click the **Continue** button.

1 STEP ONE: DE-IDENTIFICATION
THE DE-IDENTIFICATION PROCESS REMOVES CERTAIN DATA ELEMENTS FROM THE FILE HEADER AND REPLACES THE PATIENT ID WITH AN ALTERNATE SUBJECT IDENTIFIER PROVIDED BY THE USER.

- Select the type of data to be uploaded (Original/Processed) then complete the form entries.
- The Subject ID you provide replaces the existing Patient ID in the image file(s). It is recommended that a separate cross reference of original and replacement subject identifiers are kept externally.
- Source directory is the directory in which the original files are located (contains image files only).
- Target directory is an empty directory which will contain the new, de-identified files.
- Click the Continue button to begin the de-identification process.
- Check the Bypass validation steps checkbox to upload files without validating de-identification results.

Please follow the instructions outlined above:

Project: ADNI@UCLA Bypass validation steps

Select Data Type: Original XML

Research Group: [Dropdown]

Visit: [Dropdown]

Subject ID: [Text Field] Max. 10 characters allowed
Identifier to replace Patient ID

Source Directory: [Text Field] [BROWSE...]
Location of original files

Target Directory: [Text Field] [BROWSE...]
Location for target files

NOTE: Source Directory for file formats with complete headers (DICOM, GE, ECAT, etc) may contain multiple series from a single subject. Source Directory for file formats with limited headers (ANALYZE, MINC) or no headers (TIFF, TGA, etc) must contain a single series for a single subject in a single directory. Headerless files must contain a sequential slice number within the file name. ANALYZE files are assumed to be in SPM orientation.

[CANCEL] [CONTINUE]

1. Select the data type: choose **Original**.
2. Select the **Research Group** from the drop-down menu.
3. Select the **Visit** type from the visit drop-down menu.
4. Provide a **Subject ID**.
5. Click **Source Directory Browse**. The Select Source file Directory window will open. Find the directories that contain files to be uploaded or fill in the directory path. Click **Select Source File Directory**.

Select Source File Directory

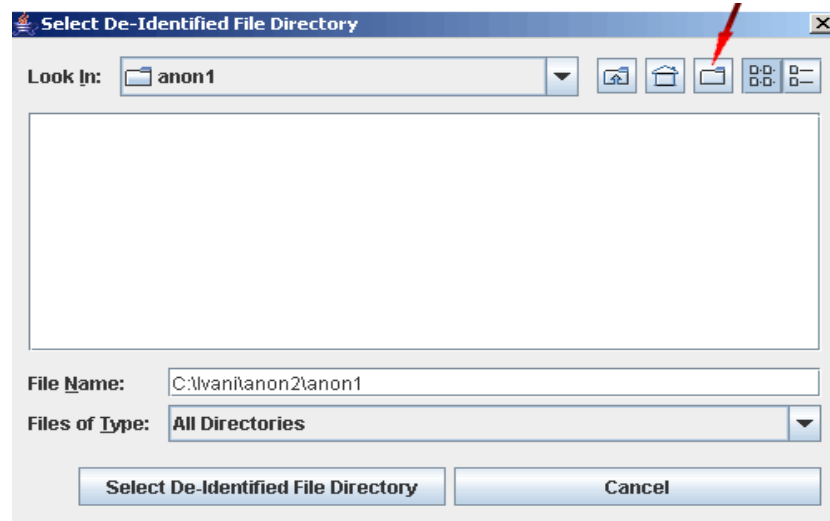
Look In: [ADNI]

File Name: C:\Documents and Settings\Desktop\ADNI

Files of Type: All Directories

[Select Source File Directory] [Cancel]

6. Click Target Directory **Browse** button to select a directory to contain the de-identified files. A new target directory may be created by clicking the folder icon, as shown below. The target directory for holding the de-identified files must be empty.



7. To upload files without validating de-identification results and upload all series without further interaction, check the **Bypass validation steps** box (Not recommended for first time users.)

Click **Continue** to begin the de-identification process

Step 2:

When the de-identification step is complete, a list of de-identified files is shown along with the de-identified header information.

After reviewing the metadata click **Submit** to transmit the de-identified images.

To remove any images, uncheck the **Selected** box beside the image sequence.

The **Compress files before transmitting** checkbox is automatically checked.

Compressing files will speed the upload process.

Clicking **Discard** will cancel the upload and return to the previous page.

[LONI > Resources > Data](#)

Verify & Submit Data

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STEP TWO: VERIFY & SUBMIT DATA

THE VERIFY PROCESS LETS YOU CONFIRM THE ACCURACY OF THE DE-IDENTIFIED INFORMATION AND DESELECT DATA SETS BEFORE YOU SUBMIT THEM TO THE LONI ARCHIVE FOR STORAGE.

1: [De-Identify](#)
2: [VERIFY & SUBMIT DATA](#)
3: [Confirmation](#)

- Review the de-identified metadata below. If you need to make corrections, please use the Back button in your browser window to return to the previous page.
- Review the listed data sets in the box below. Uncheck the box beside any data set which you don't want submitted (such as a localizer or scout).
- Click the SUBMIT button to start the data transmission process.

DE-IDENTIFIED FILES:

Subject ID	Sequence Name	Number of Images	Selected
035_S_0003	SAG MPRAGE 8 CHA...	1	<input checked="" type="checkbox"/>

Compress files before transmitting

REVIEW DE-IDENTIFIED HEADER INFORMATION:

LONI De-Identified File Attributes

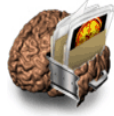
Series Description: SAG MPRAGE 8 CHANNEL
Series ID: 4.38_2A51x0.2IUGuEgw\$GvL8BP0G4imEXbNqZ_Nyp8jWB9f51brR5_JBAEfd2LRS
C:\Documents and Settings\ivani\Desktop\test\New Folder\4.38_2A51x0.2IUGuEgw\$

Metadata for DICOM file ADNI_035_S_0003_MR_SAG_MPRAGE_8_CHANNEL_br_raw_201001

Tag	Tag Description	Tag Value
00020000	Group Length.	180
00020001	File Meta Information Version.	0001
00020002	Media Storage SOP Class UID.	1.2.840.10008.5.1.4.1.1.4
00020003	Media Storage SOP Instance UID.	2.16.124.113543.6006.99.1612868
00020010	Transfer Syntax UID.	1.2.840.10008.1.2.1
00020012	Implementation Class UID.	2.16.124.113543.6006.99.1249489
00080000	Group Length.	778
00080005	Specific Character Set.	ISO_IR 100
00080008	Image Type.	ORIGINAL PRIMARY M MD
00080016	SOP Class UID.	1.2.840.10008.5.1.4.1.1.4
00080018	SOP Instance UID.	2.16.124.113543.6006.99.1612868

Step 3:

The progress bar will show the progress of the upload process. When the transmission is complete choose to Archive More files, Review Uploaded Files, or Log Out.



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Confirmation

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CONFIRMATION

THE ARCHIVE PROCESS HAS COMPLETED AND THE FILES LISTED IN THE TRANSMISSION RESULTS WINDOW HAVE BEEN TRANSMITTED TO THE LONI ARCHIVE.

- To archive additional image data, click the ARCHIVE MORE button.
- To review your most recently archived data, click the REVIEW UPLOADED FILES button.
- To keep a record of the archived data, please print and retain the Log File specified in the TRANSMISSION RESULTS window.

1: De-Identify
2: Verify & Submit Data
3: CONFIRMATION

TRANSMISSION RESULTS

Progress: 100%

Your Connection Speed: 1001.0 KB/s

Modem DSL T1 LAN

Completed at 1376 KB/s.
Uploading file 2/2 parameters.xml ...
Completed at 12 KB/s.
Tue Jan 19 17:55:46 PST 2010 Finished upload at 1001.0 KB/s.

G. ARCHIVING DATA IN BATCH

The Batch Archive process is similar to Single Archive, except that multiple subjects and image series can be added to the queue and submitted in a batch. The Batch Archive can be used to de-identify and archive files from multiple acquisitions and/or subjects. Batches may be of the same or different file formats and modalities.

The advantage of archiving images in batch is the possibility to upload several images simultaneously. However, the batch option does not allow the user to review results of the de-identification process prior to the upload.

BATCH ARCHIVE INSTRUCTIONS

On the “Archive and Review” page, select your **Project/Site** from the drop down menu and click the “**Batch Archive**” button. Do not open multiple IDA browser windows when archiving data.



Archive and Review

PROJECT INFORMATION: MENU | LOG OUT

Select Project: [ADNI@University of California, Los Angeles]

ARCHIVE FILES: The data archival process involves two basic steps: 1. De-identify the header file by replacing any fields that identify the subject, such as Patient Name and ID, and 2. Transmit image data securely from the local site to LONI.

To archive a single study, click the SINGLE ARCHIVE button. To archive multiple studies in batch mode, click the BATCH ARCHIVE button. NOTE: Do not open multiple IDA browser windows while archiving data.

SINGLE ARCHIVE BATCH ARCHIVE

VIEW RECENTLY ARCHIVED VOLUMES: Click on the VIEW button to visualize the volumetric representation of your uploaded files. Click on the REFRESH button to update the volume list.

SUBJECT ID	SERIES DESCRIPTION	No. OF IMAGES	DATE	View	Download
01_555	SAG MPRAGE 8 CHANNEL	1	Tue, 01/19/2010	VIEW	DOWNLOAD
8596902	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8596702	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8596701	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
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8587301	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8066250	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8066201	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8913502	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD
8897001	t1_mpr_cor	256	Wed, 01/13/2010	VIEW	DOWNLOAD

Complete the required information on the De-Identify page then click the Continue button.



De-Identify

STEP ONE: DE-IDENTIFICATION MENU | LOG OUT

THE DE-IDENTIFICATION PROCESS REMOVES CERTAIN DATA ELEMENTS FROM THE FILE HEADER AND REPLACES THE PATIENT ID WITH AN ALTERNATE SUBJECT IDENTIFIER PROVIDED BY THE USER.

- Select the type of data to be uploaded (Original/Processed) then complete the form entries.
- The Subject ID you provide replaces the existing Patient ID in the image file(s). It is recommended that a separate cross reference of original and replacement subject identifiers are kept externally.
- Source directory is the directory in which the original files are located (contains image files only).
- Target directory is an empty directory which will contain the new, de-identified files.
- Click the Continue button to begin the de-identification process.
- Check the Bypass validation steps checkbox to upload files without validating de-identification results.

Please follow the instructions outlined above:

Project: ADNI@UCLA Bypass validation steps

Select Data Type: Original XML

Research Group: [dropdown]

Visit: [dropdown]

Subject ID: [input] Max. 10 characters allowed

Source Directory: [input] [BROWSE...]

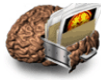
Target Directory: [input] [BROWSE...]

NOTE: Source Directory for file formats with complete headers (DICOM, GE, ECAT, etc) may contain multiple series from a single subject. Source Directory for file formats with limited headers (ANALYZE, MINC) or no headers (TIFF, TGA, etc) must contain a single series for a single subject in a single directory. Headerless files must contain a sequential slice number within the file name. ANALYZE files are assumed to be in SPM orientation.

[CANCEL] [CONTINUE]

On the Batch Queue page, click the **Add More** button to add more studies. Repeat this process for each study or subject to be archived. Click **Remove** to remove from the queue images that should not be archived.

When all desired images are added to the queue, click **Submit** to de-identify and upload all files.



LONI > Resources > Data

Image Database Batch Queue

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REVIEW BATCH QUEUE

THE IMAGE STUDIES LISTED BELOW HAVE BEEN PREPARED FOR BATCH DE-IDENTIFICATION AND UPLOAD.

CANCEL

- Click "ADD MORE" to add another study to the queue or "SUBMIT" to archive this batch now.
- REMEMBER to leave your browser window open until all uploads are complete and you have been returned to this page or the Archive & Review page.
- Click "CLEAR" to clear the batch queue. All logs will be deleted.

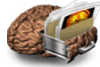
Subject	Data Type	Research Group	Source	Status	Date	Remove
035_S_0003	Original	Patient	C:/Documents and Settings/ivanif/...	Queued	1/20/10	remove
035_S_0005	Original	Patient	C:/Documents and Settings/ivanif/...	Queued	1/20/10	remove

CLEAR ADD MORE SUBMIT

No further interaction is necessary until the process is completed and the browser returns to the Image Database Batch Queue page with a listing of recently archived files and their statuses.

Check the **Status** column to verify if the file(s) were successfully archived as below.

Click **Clear** to return to the Archive and Review page.



LONI > Resources > Data

Image Database Batch Queue

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REVIEW BATCH QUEUE

THE IMAGE STUDIES LISTED BELOW HAVE BEEN PREPARED FOR BATCH DE-IDENTIFICATION AND UPLOAD.

CANCEL

- Click "ADD MORE" to add another study to the queue or "SUBMIT" to archive this batch now.
- REMEMBER to leave your browser window open until all uploads are complete and you have been returned to this page or the Archive & Review page.
- Click "CLEAR" to clear the batch queue. All logs will be deleted.

Subject	Data Type	Research Group	Source	Status	Date	Remove
035_S_0003	Original	Patient	C:/Documents and Settings/ivanif/...	Archived	1/20/10	remove
035_S_0005	Original	Patient	C:/Documents and Settings/ivanif/...	Archived	1/20/10	remove

CLEAR ADD MORE SUBMIT

