ADNI

Alzheimer's Disease Neuroimaging Initiative
MRI Technical Procedures Manual

Table of Contents

I. Contact Information

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

II. ADNI Study Overview

Background

Over 4 million people in the US have Alzheimer's Disease or AD, and a very substantial number have other dementias. The cost to the US economy is well over $100 billion/yr. The incidence of dementia is expected to double during the next 20 years. No existing treatment has yet been shown to slow the progression of AD but a large number of potential treatments are under development. Once such treatments for patients with AD are approved, the next obvious step will be to perform prevention trials on those at high risk for AD, such as subjects with MCI, family histories of dementia, or genetic risk factors for AD. Many elderly people have memory problems or other risk factors for AD. Once effective treatments for AD emerge, it will be very important to identify subjects at risk for cognitive decline and dementia at the earliest stage possible.

The Alzheimer's Disease Neuroimaging Initiative will be used to help researchers and clinicians develop new treatments and monitor their effectiveness. This will increase the safety and efficacy of drug development by decreasing the time and cost of clinical trials. This project is the most comprehensive effort to date to combine neuroimaging and other biomarkers of the cognitive changes associated with Mild Cognitive Impairment (MCI) and Alzheimer 's Disease (AD).

Goal

The Alzheimer's Disease Neuroimaging Initiative (ADNI) is a 5-year public-private partnership to test whether serial magnetic resonance imaging (MRI), positron emission tomography (PET), other biological markers, and clinical and neuropsychological assessment can be combined to measure the progression of mild cognitive impairment and early Alzheimer's disease. There are three major goals of ADNI. The first goal is to develop improved methods that will lead to uniform standards for acquiring longitudinal, multi-site MRI and PET data on patients with Alzheimer's disease, mild cognitive impairment, and elderly controls. The second goal is to create a generally accessible data repository that describes longitudinal changes in brain structure and metabolism while acquiring clinical, cognitive and biomarker data for validation of imaging surrogates. The final goal is to determine those methods that provide maximum power to determine treatment effects in trials involving these patient groups. It is expected that ADNI will provide extensive new data concerning the natural history of brain changes which occur during the transition from normal aging to MCI to AD that can be used for future design and power of clinical trials and extensive information about the relationship between brain imaging changes and changes in biomarkers obtained from blood and CSF.

Study design for the ADNI trial

AD subjects (200) will be studied at 0, 6, 12, 24 months.
MCI subjects at high risk for conversion to AD (400) will be studied at 0, 6, 12, 18, 24, 36 months.
Age matched controls (200) will be studied at 0, 6, 12, 24 and 36 months.
25% of the subjects will be scanned at 3 Tesla at every timepoint.
1.5T Scans = 4200 -- 3T Scans = 1050
Total MRI scans performed for ADNI trial: 5250

III. Site Qualification

A. Site Qualification Overview:

Prior to any ADNI subjects being scanned at a particular site, that site must complete ADNI site qualification. Site qualification includes two different exams. The first, being a scan on the specially designed ADNI phantom with the ADNI sequences loaded by your local service engineer, with an additional coronal MP-RAGE. Secondly, your site will be asked to scan a human volunteer with the approved ADNI sequences loaded by your local service engineer. Mayo QC will review the phantom and human scans for the correct parameters and good image quality. If the phantom scan does not pass Mayo QC review, your site will be asked to re-scan the phantom after making suggested changes by the Mayo QC team.

Please note: The same MRI scanner must be used for site qualification and ALL subsequent subject scans during the ADNI trial. If the same MRI scanner is not used, the scan will not be reimbursed, and the subject will need to be re-scanned on the ADNI qualified scanner.

Phantom Scan Protocol:
1) Localizer
2) MP-RAGE (with slice thickness increased to cover phantom)
3) MP-RAGE - REPEAT (same as above)
4) B1 Calibration - Head Coil (if applicable)
5) B1 Calibration - Body Coil (if applicable)
6) T2 Dual Echo (Straight Axial - Through center of phantom)
7) MP-RAGE CORONAL (with slice thickness increased to cover phantom)

Human Volunteer Scan Protocol:
(No adjustments should be made to this protocol)
1) Localizer
2) MP-RAGE
3) MP-RAGE - REPEAT
4) B1 Calibration - Head Coil (if applicable)
5) B1 Calibration - Body Coil (if applicable)
6) T2 Dual Echo (Straight Axial - cover below cerebellum through top of head)

After each scan protocol, please upload images to LONI (see Appendix 5) using the ADNI naming conventions detailed later in this section.

Any questions concerning these 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 protocols with an additional coronal MP-RAGE. There should be one phantom qualification scan on 1.5T and 3T (if applicable).

Note: This can be done prior to IRB approval

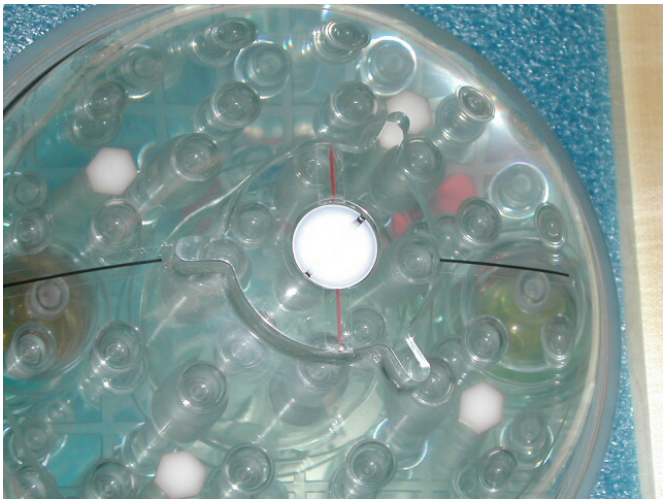
Please Note: Your MRI scanner vendor (GE, Siemens, or Phillips) will be supplying electronic protocols (WIPs) for installation by your local service engineer. This will ensure that you have the correct protocol for your MRI scanner. If you have any questions about this procedure please contact: **adnimri@mayo.edu**
Use only the imported ADNI 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 after each ADNI subject that is 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 ADNI 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

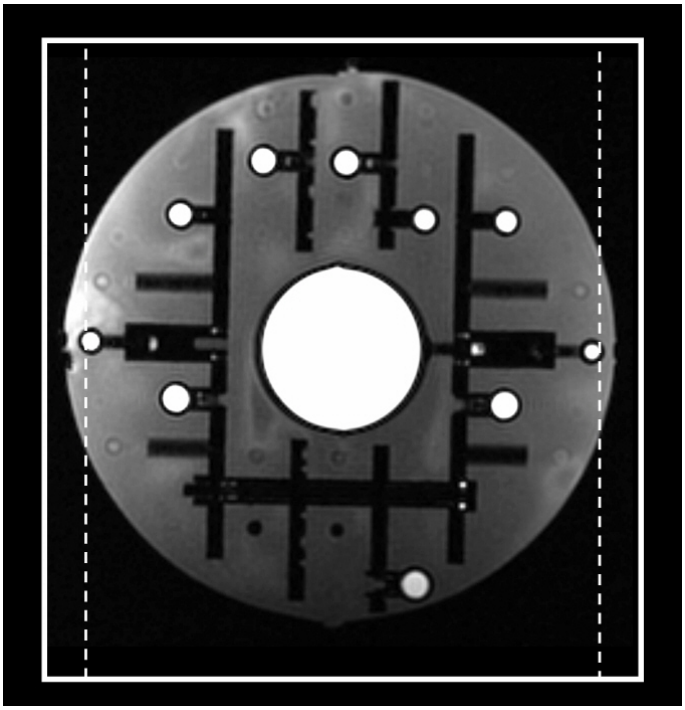
Phantom Scan Protocol:

Scan the phantom using the entire electronically loaded ADNI protocol plus an additional coronal MP-RAGE.

Phantom Scan Protocol:
1) Localizer
2) MP-RAGE (with slice thickness increased to cover phantom)
3) MP-RAGE - REPEAT (same as above)
4) B1 Calibration - Head Coil (if applicable)
5) B1 Calibration - Body Coil (if applicable)
6) T2 Dual Echo (Straight Axial - through the center of the phantom)
7) MP-RAGE CORONAL (with slice thickness increased to cover the phantom)

1. **Localizer**
   Please run a localizer to be sure the phantom is positioned correctly in the head coil.

2. **Sagittal MP-RAGE**
   It is important to use the official ADNI parameters for these sequences, with one exception. Increase the slice thickness of the MP-RAGE acquisitions by 0.1 (so 1.2 becomes 1.3 etc.), until the left-to-right field or top bottom field of view is sufficiently large enough to avoid clipping the sides of the phantom. *NOTE: This may not be necessary on some systems*. Please see following examples:



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.

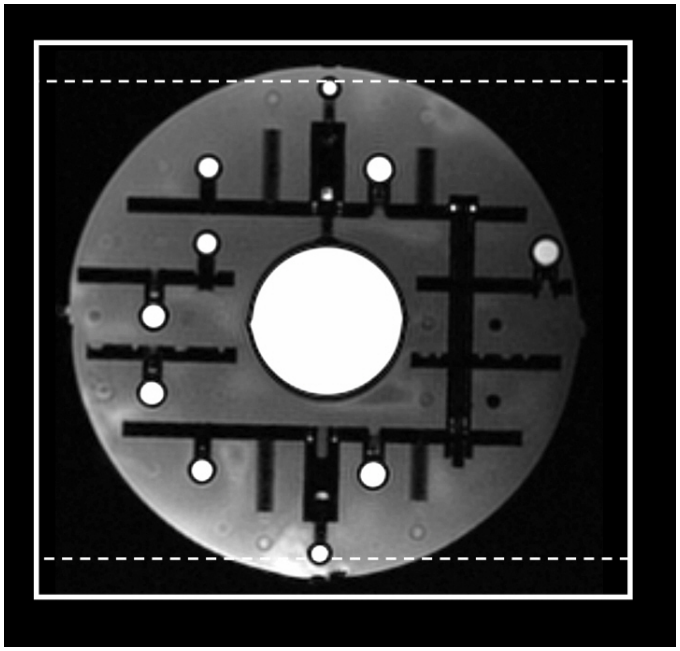
3. **Sagittal MP-RAGE REPEAT**
   Repeat the identical MPRAGE as above with no changes to the scan prescription.

4. **B1 Calibration Head Coil** (if applicable)
   Position the acquisition box to cover the entire phantom.

5. **B1 Calibration Body Coil** (if applicable)
   Position the acquisition box to cover the entire phantom.

6. **T2 Dual Echo**
   Straight Axial acquisition through the center of the phantom.

7. **MP-RAGE Coronal**
   In addition to the ADNI protocol please add one additional acquisition that will be the same prescription as the previous sagittal MPRAGE. **Only change the position to a CORONAL sequence.** This is important and will allow us to use both the sagittal and coronal MPRAGE acquisitions to assess system distortion. *NOTE: This coronal will only be acquired for site qualification purposes.* Please see example.



Again, 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.

Data Transfer:
Please upload all the sequences acquired for the phantom scan to the LONI website as detailed in Appendix 5.

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 ADNI protocol and your site has passed the phantom scan qualification, one human volunteer must be scanned using the ADNI scanning protocol at 1.5T and one at 3T *(if applicable).*

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 15 of this manual. It is crucial to follow the appropriate pre-scan procedures, subject positioning guidelines, and ADNI sequences.

Human Volunteer Scan Protocol: *(no adjustments should be made to this protocol)*
1) Localizer
2) MP-RAGE
3) MP-RAGE - REPEAT
4) B1 Calibration - Head Coil (if applicable)
5) B1 Calibration - Body Coil (if applicable)
6) T2 Dual Echo (Straight Axial - cover below cerebellum through top of head)

Please make sure to use stereotactic marker on subjects' right temple. Please see "MRI Pre-Scan Procedures" for complete instructions on scanning set-up and acquisition.

Data Transfer:
Please upload all the sequences acquired for the volunteer scan to the LONI website as detailed in Appendix 5.

Volunteer Naming:

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

   Volunteer scans should follow the naming convention:
   XXX_V_YYYY (X=Site#/V=Volunteer#/Y=Phantom#

   For example, each phantom scan from site 007 should be coded:
   007_V_0001

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, an e-mail 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 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.

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 O_2 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.

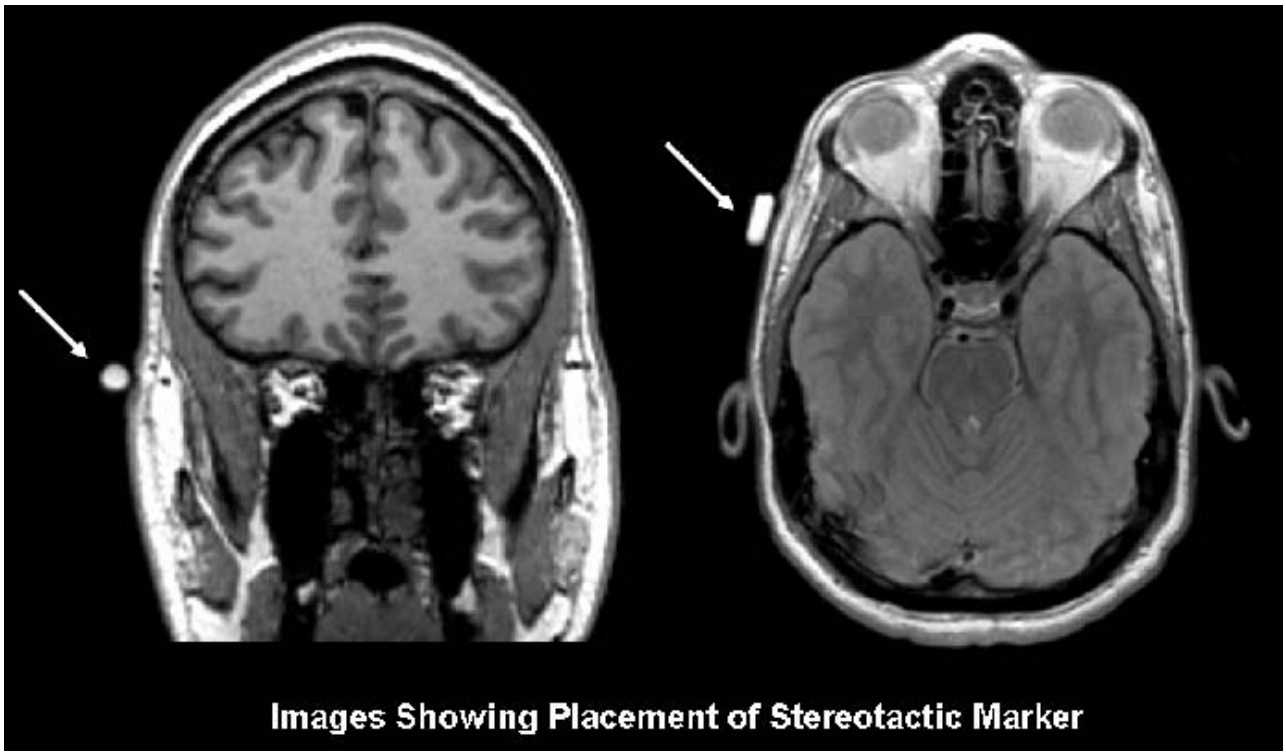
2. Please follow the procedures below for positioning the subject in the head coil:

    - 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 Baseline 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:

- Localizer Scan (20 secs)
- MP RAGE (8-10 mins)
- MP RAGE - Repeat (8-10 mins)
- B1 Calibration Scan - PA coil on GE and Siemens only (30 secs).
- B1 Calibration Scan - Body coil on GE and Siemens only (30 secs).
- Double Spin Echo T2 (5 mins)

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

- Localizer Scan (20 secs)
- MP RAGE (8-10 mins)

Detailed acquisition parameters can be found in Appendix 3

The Mayo QC team will check all imaging parameters to assure the correct sequence was used. If the electronically loaded ADNI 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 Log

1. The "MRI Scan Information Form" should be completed at the time of acquisition for every ADNI 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 ADNI 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

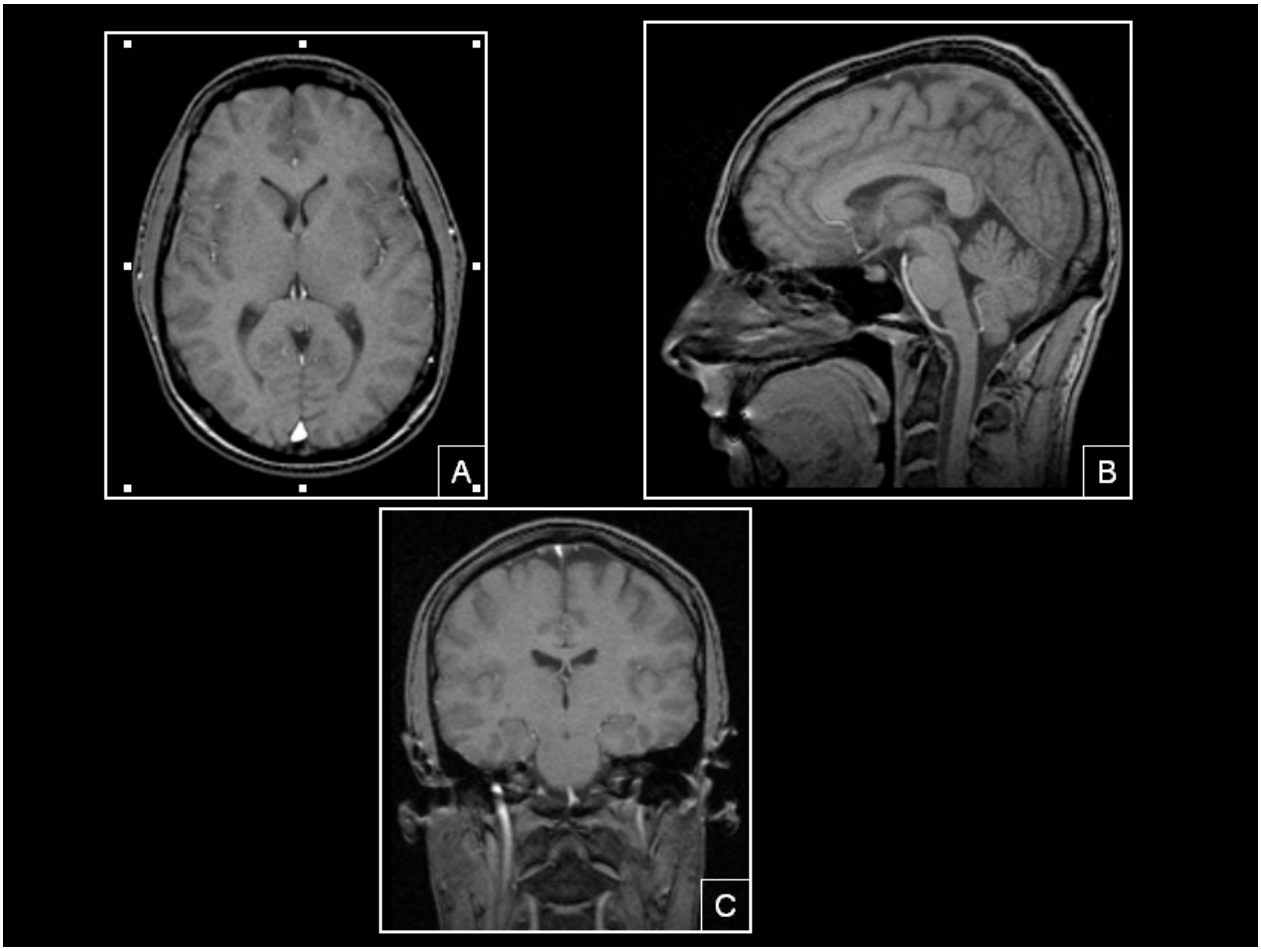
1. Please enter the subject's information into the scanner following your standard local practice. This will assure the scan is formatted for your local archival system. When data are uploaded to LONI the scan header will be de-identified and rendered HIPAA compliant. Data will be identified at the LONI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

C. Scan #1: Tri-Planar Scout: **(If available, otherwise use a straight axial localizer)**

1. A quick acquisition in 3 orthogonal planes for anatomical orientation. One slice 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.

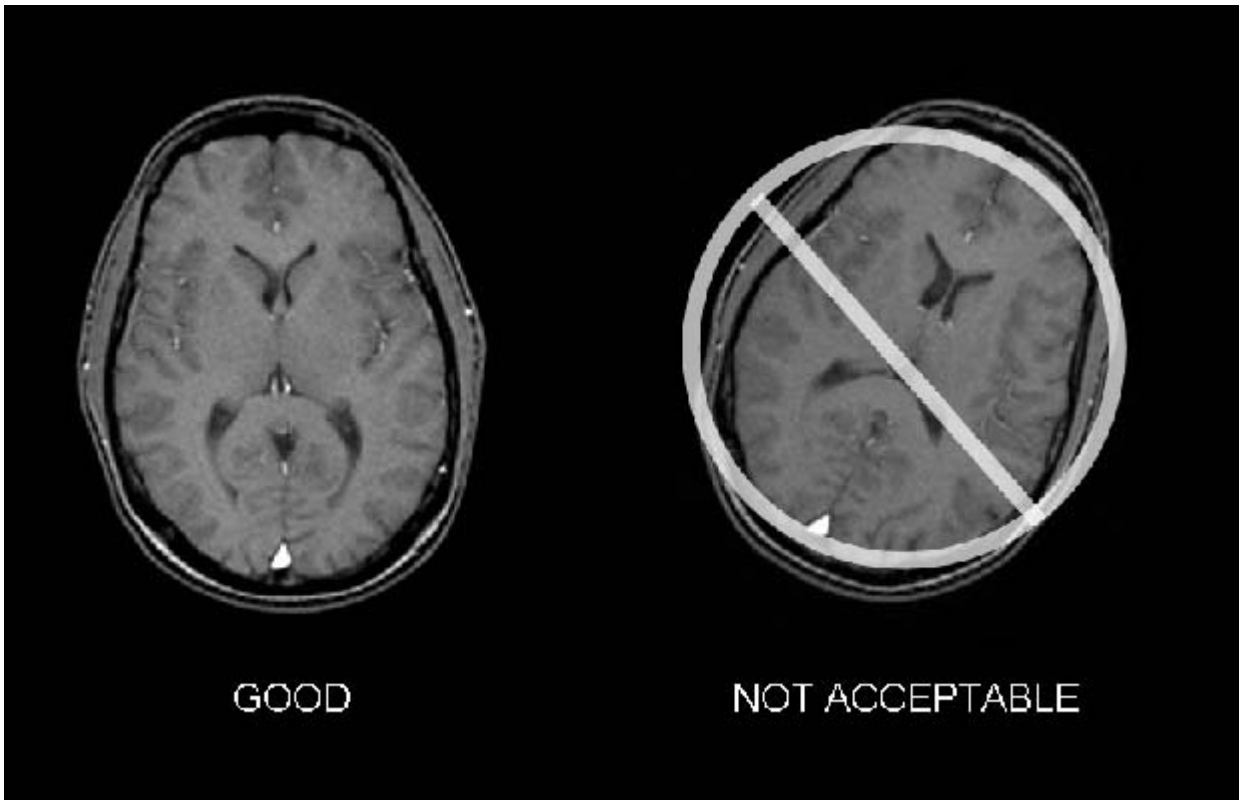
2. Proper placement in the head coil is crucial because scans are acquired straight, not in an oblique orientation.

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.



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.

D. Pre-scan Adjustments

1. Most modern MRI scanners provide automated adjustment procedures for RF coil tuning and frequency adjustments after the subject is positioned in the magnet. Follow the adjustment procedures provided by the manufacturers.

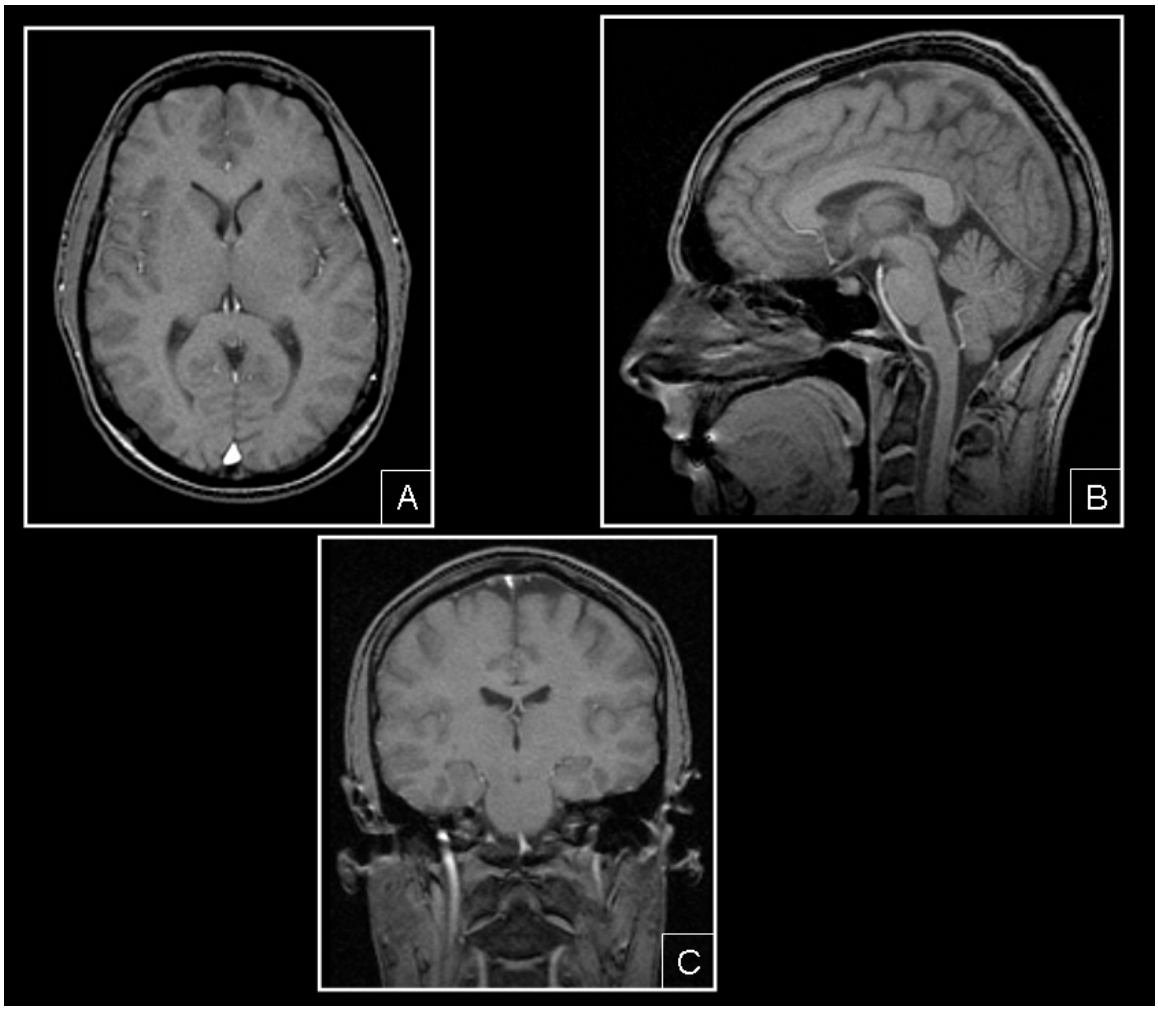
E. Scan #2: 3D MP-RAGE

Please Note: Your MRI scanner vendor (GE, Siemens, or Phillips) will be supplying electronic protocols (WIPs) for installation by 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.

Use only the ADNI sequences imported onto your scanner. A detailed description of the MP-RAGE sequence can be found in Appendix III. **Please make sure to use the correct protocol for your manufacturer, scanner type, software revision, and field strength.**

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 will result and the study cannot be processed**. 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



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.

F. Scan#3: 3D MP-RAGE Scan Repeat

For every ADNI exam, the sagittal MP-RAGE sequence is acquired a second time, immediately after the first. Unless indicated, the scan prescription should be identical for each MP-RAGE.

The MP-RAGE is run twice for several reasons. Often subjects move to varying degrees during MRI acquisitions, so that either the first or second MP-RAGE acquisition will be of superior quality. Thus, acquiring two MP-RAGES will maximize the chance that at least one will be successful and usable for analysis. Also, in some cases, where both MP-RAGES are of good quality, it would be possible to retrospectively average the two data sets to improve the signal-to-noise.

Since there are two MP-RAGES built into the ADNI scanning session, it is acceptable if one the MP-RAGES is not considered of satisfactory quality. However, if neither of the MP-RAGES is considered acceptable, you are encouraged to attempt one more additional MP-RAGE. If after three attempts, and no acceptable MP-RAGES have been acquired, please discontinue the exam and notify the study coordinator.

Please Note:

- It is mandatory that the ADNI acquisition protocols electronically imported to your MRI be used for all sequences at the Baseline 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 Baseline and all subsequent visits will result in the request for a rescan of the subject.
- It is mandatory that the ADNI site qualified scanner be used for all subjects in the ADNI study.
- Failure to use the ADNI site qualified scanner for all subjects in the ADNI will result in the request for a rescan of the subject.

G. Scan #4: B1 Calibration Head Coil Scan: (Only applicable for phased array head coil on GE and Siemens systems)

1. **Orientation:** Straight sagittal

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 will result and the study cannot be processed**. Please see the images below and use as a guide to correctly position the acquisition box.

H. Scan #5: B1 Calibration Body Coil Scan: (Only applicable for phased array head coil on GE and Siemens systems)

1. **Orientation:** Straight sagittal

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 will result and the study cannot be processed**. Please see the images below and use as a guide to correctly position the acquisition box.

I. Scan #6: Proton Density/T2-Weighted Fast Spin Echo

Please Note: Your MRI scanner vendor (GE, Siemens, or Phillips) will be supplying electronic protocols (WIPs) for installation by 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.
Please see Appendix 3 for a detailed description of the spin echo sequence electronically loaded onto your MRI scanner.

1. **Orientation:** Straight Axial, prescribe slices inferior to superior.

2. **Positioning:** Position on mid-sagittal slice from tri-planar scout. Make sure to get full BRAIN coverage. 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.

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 ADNI MRI Scan Worksheet. The comments sections should include the reason the subject was unable to complete the MRI.

B. Clinical Reads

1. **Every subject for the ADNI *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 for the ADNI 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. This is not to be confused with the repeat MP-RAGE.

    b. Mayo QC will check all ADNI scans to be sure the correct, electronically loaded sequences have been used to scan each subject. Repeat exams may also be required if the incorrect scan sequence, orientation, or angulations are used. It is imperative to use the ADNI approved acquisition sequence with every ADNI subject. 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 ADNI 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 ADNI, each site is **required** to perform *on going* quality control scans on the ADNI phantom using the ADNI protocol immediately following each subject scan.

> **IMPORTANT:** If a site fails to perform these phantom scans and they have not been performed within 24 hours, the ADNI will not accept or reimburse the subject scan. The study coordinator and the principal investigator at each site will be notified if a phantom scan has not been received with each subject scan and you may be asked to bring the subject back for a re-scan.

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 QC protocols **after each and every subject scan.**

> **Please Note:** Your MRI scanner vendor (GE, Siemens, or Phillips) 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 sequences.**

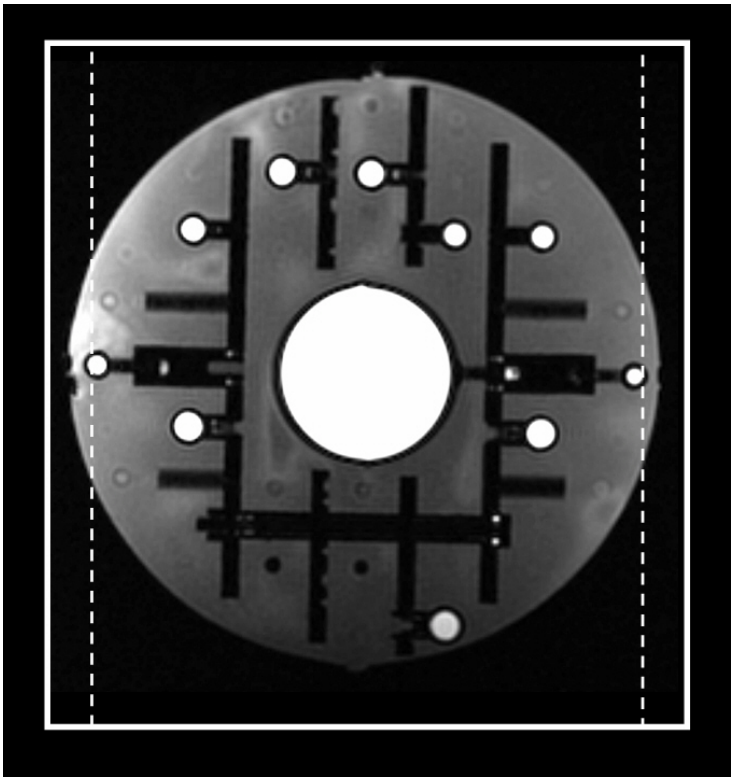
On Going QC Phantom Scan Protocol:

> **Phantom Scan Sequences:**
> 1) Localizer
> 2) Straight Sagittal MP-RAGE (slice thickness should cover entire phantom)

1. Once the subject scan is completed, register the phantom as a new exam.

2. **Localizer** - Please run a localizer to be sure the phantom is positioned correctly in the head coil.

3. **Sagittal MP-RAGE** - The on-going quality control MP-RAGE is identical to the subject MP-RAGE except for in some cases, 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 after each ADNI subject that is imaged. We hope that 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.

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 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 ADNI 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 on. This will ensure that the phantom does not roll of its base and fall when it is not being used.

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.

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 5.

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.

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.

MRI Screening Form
Alzheimer's Disease Neuroimaging Initiative MRI Study
Alzheimer's Disease Cooperative Study (ADCS)

Date ____/____/___ Participant Code _____

Please check Yes/No for each of the following:

☐ Yes ☐ No Previous MRI scan

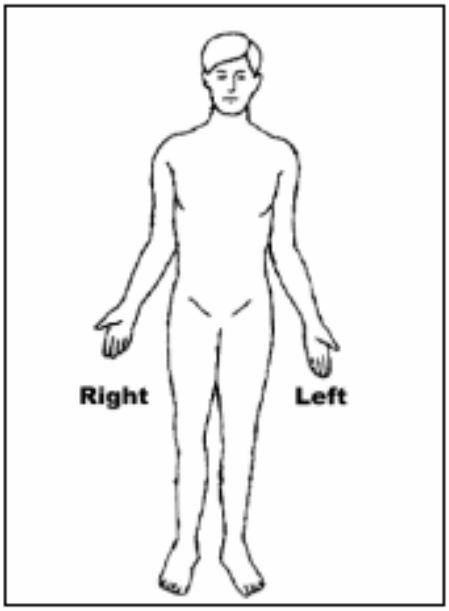
Exclusionary Items:

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

Please Inform MRI Center:

☐ Yes ☐ No Prosthesis or implant
☐ Yes ☐ No Aortic Clip (s)
☐ 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
☐ 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 participant or participant's representative *Name of Representative*

_____ Date ____/____/____
Signature of person administering screening form

Appendix 2: MRI Scan Information Log

- The "MRI Scan Information Log" should be completed at the time of acquisition for every ADNI 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.

ADNI - Execution Phase (ADNI)

1.5T MRI Scan Information

Participant: ☐
Participant ID

Visit: Screening Visit

To be completed by Study Coordinator:

Site Code:_____
Study Coordinator Name:_____
Telephone #:_____
ADNI Participant Initials:_____
Anticipated Date of MRI Scan ____/____/____
To be completed by MRI Technologist: (If section above is incomplete please contact study coordinator for subject information)

Important: It is mandatory that the ADNI site qualified scanner be used for all participants in the ADNI study. It is also mandatory that the same ADNI approved sequences are used at all ADNI scans.

MRI Operator Initials ☐

Scan Date ☐☐☐☐☐☐☐☐
Month Day Year

Please follow instructions in the ADNI Technical Manual for positioning the participant in the head coil. Please Stereotactic Marker on the patients (RT) temple.

1. Tri-Planar Scout (if available, otherwise use an axial scout)
   ***Check participant positioning in the head coil, reposition and re-scout if necessary*

   Scout - Completed?
   ☐ Yes
   ☐ No

   Comments ☐

2. Straight Sagittal MPRAGE Sequence
   ***Please position the acquisition box to contain the whole brain and skull. Studies without full brain coverage cannot be processed. Please review the scan for motion and other artifacts. Please re-acquire if necessary.*
   MPRAGE - Completed?
   ☐ Yes
   ☐ No

   Comments ☐

3. Repeat Straight Sagittal MPRAGE Sequence
   ***Repeat of Scan 2 unless a change is required to adjust for correct coverage.Repeat*
   MPRAGE - Completed?
   ☐ Yes
   ☐ No

   Comments ☐

ADNI - Execution Phase (ADNI)

1.5T MRI Scan Information

Participant: _____
Participant ID

Visit: Screening Visit

4. B1 Calibration Head Coil Scan (Only applicable for phased array head coil on GE and Siemens systems)

***Please position the acquisition box to contain the whole brain and skull. Studies without full brain coverage cannot be processed. Please review the scan for motion and other artifacts. Please re-acquire if necessary.*

B1 Calibration (Head) - Completed?

☐ Yes
☐ No

Comments

5. B1 Calibration Body Coil Scan (Only applicable for phased array head coil on GE and Siemens systems)

***Please position the acquisition box to contain the whole brain and skull. Studies without full brain coverage cannot be processed. Please review the scan for motion and other artifacts. Please re-acquire if necessary.*

B1 Calibration (Body) - Completed?

☐ Yes
☐ No

Comments

6. Straight Axial Fast or Turbo Spin Echo

***Please position the acquisition stack to contain the whole brain from below cerebellum through top of head.*

Completed?

☐ Yes
☐ No

Comments

7. In new exam; Perform ADNI QC Scan. Localizer and Straight Sagittal MPRAGE (with increased slice thickness to ensure phantom coverage)

ADNI QC Scan - Completed?

☐ Yes
☐ No

Comments:

8. Data Transfer and Local Data Archive:
Was data transferred to LONI within 24 hours of scan?

Data must be transmitted to LONI within 24 hours of the MRI scan. If your site is unable to complete the transfer within 24 hours please indicate the problem in the "Comments" section below.

☐ Yes
☐ No

Transfer Date

☐☐☐☐☐☐☐☐
Month Day Year

ADNI - Execution Phase (ADNI)

1.5T MRI Scan Information

Participant: _____
Participant ID

Visit: Screening Visit

Comments

_____

Data Archived Locally

If No, please explain under comments.

☐ Yes

☐ No

Archive Medium _____ Comments _____

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/

Scan #1: Triplanar

Scan #2: Volumetric 3D T1-weighted MP-RAGE

Scan #3: Repeat Volumetric 3D T1-weighted MP-RAGE

Scan #4: B1 Calibration Head Coil Scan: (Only applicable for phased array head coil on GE and Siemens systems)

Scan #5: B1 Calibration Head Coil Scan: (Only applicable for phased array head coil on GE and Siemens systems)

Scan #6: Proton Density/T2-weighted Spin echo (Fast/Turbo)

Phantom Scans:

Scan #1: Triplanar

Scan #2: Volumetric 3D T1-weighted MP-RAGE

Appendix 4: ADNI Acquisition Troubleshooting Guide

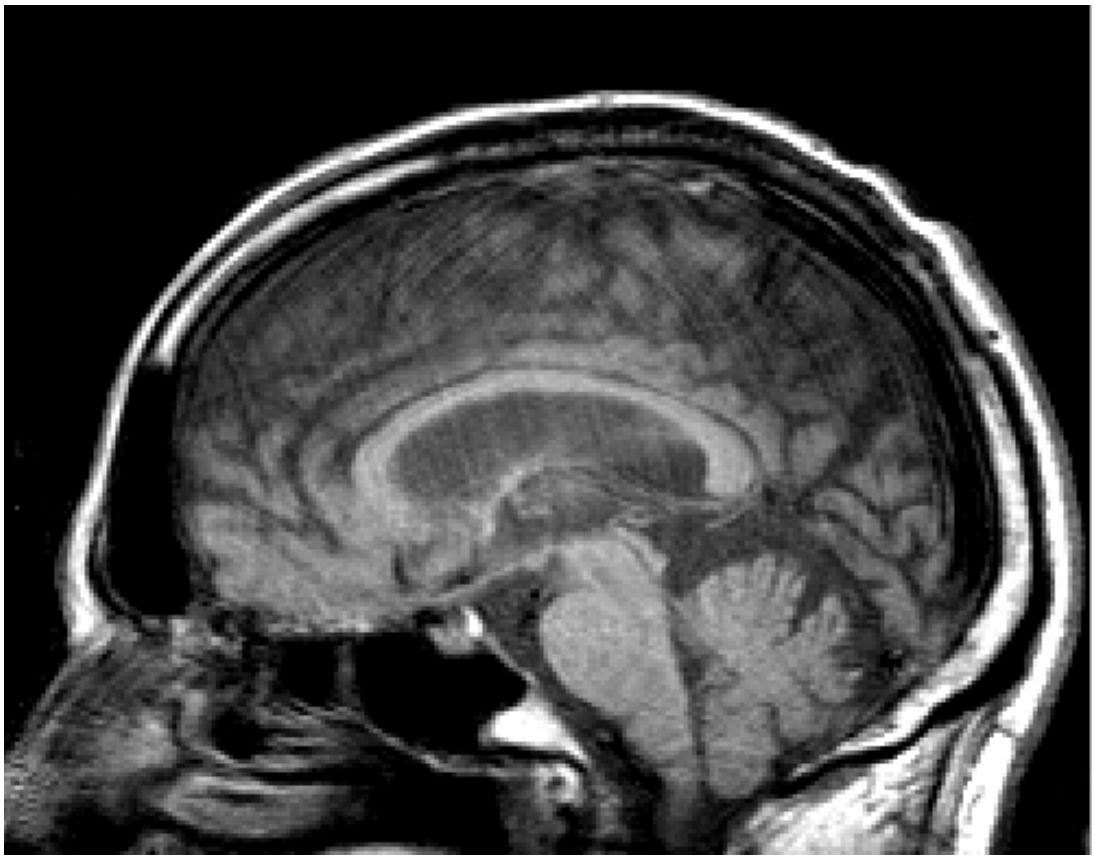
Superior image quality is imperative to the success of the ADNI study. Every effort should be made to acquire excellent scans on ADNI subjects at their first MRI appointment and at all subsequent visits. This prevents the clinical centers from rescheduling additional repeat MRI's for subjects.

It should also be noted that the T1 acquisition sequence is the most important sequence in the ADNI. 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 (DSE, etc.).

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.

T1-Weighted 3D Imaging

Example 1: Image Degradation due to Movement Artifact



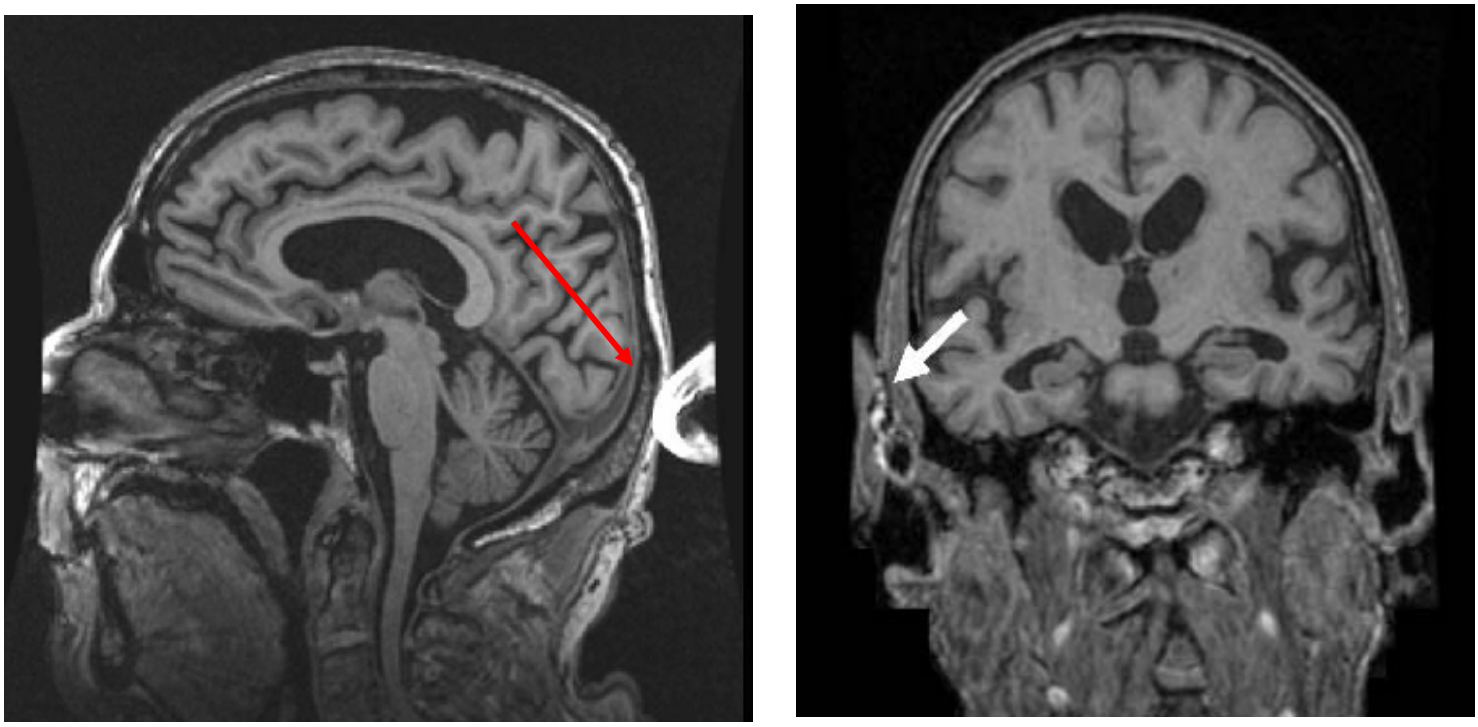
Problem:
In this example movement has caused motion artifacts. Acquisitions with major motion artifacts will not be accepted and a repeat scan may be requested.

Possible Remedies:

If movement is due to the subject's head moving, reacquire T1 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.

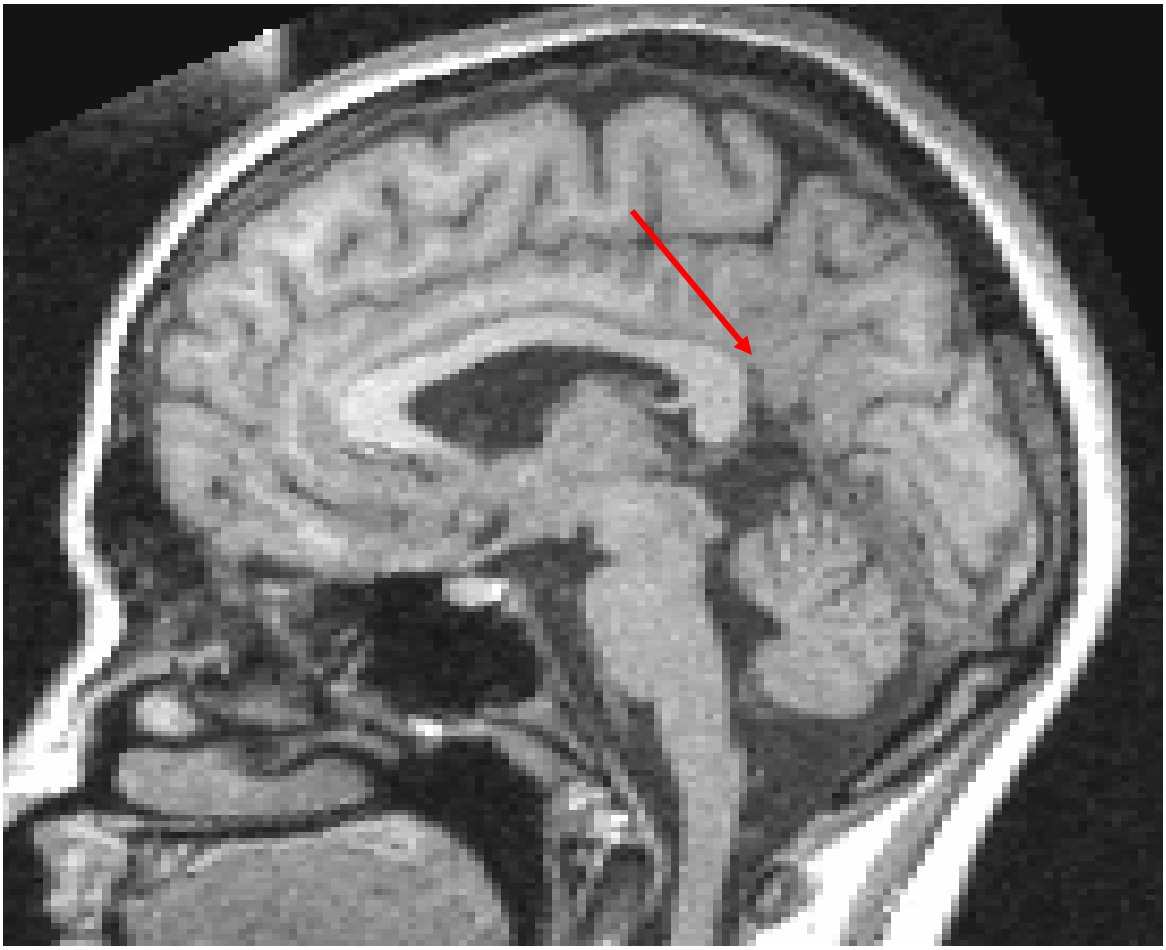
Example 2: Wrap Around



Problem:
In this example, wrap around occurs in the T1 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. If the acquisition box does not fully cover the subject's head (including the nose), increase the FOV and increase the number of phase encoding steps accordingly so as not to change the pixel resolution of the image.
2. Reposition the T1 acquisition box to cover the entire head (including the nose) and rescan.

Example 3: Low Signal to Noise



Problem:
In this example, the image has low signal to noise. Please note the lack of contrast between gray and white matter as well as the high noise signal in the background of the image. Acquisitions with low SNR, especially due to incorrect sequence parameters, will not be accepted and a repeat scan will be requested.

Possible Remedies:
1. Pre-scan again
2. Check pulse sequence parameters
3. Make sure head coil is properly secured.

Example 4: 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.

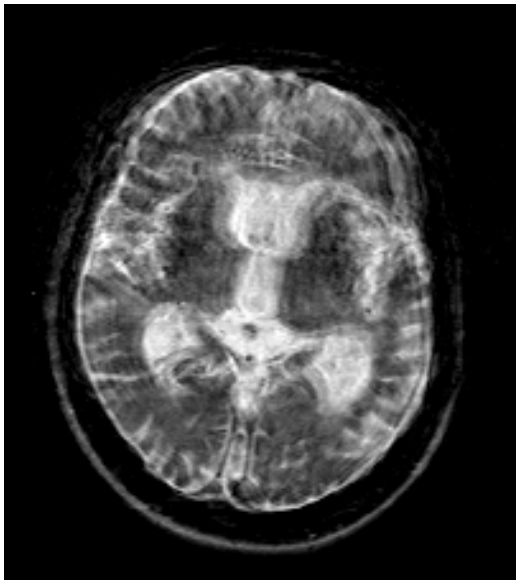
Example 5: Metal Artifact

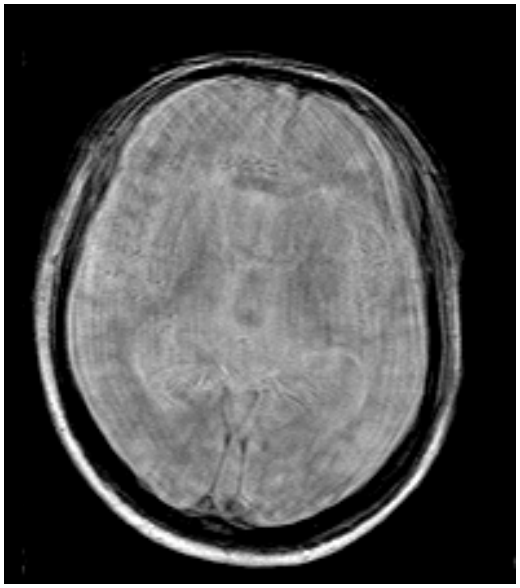
Problem:
Magnetic field distortions: In this example there is blacking out due to the presence of metal near the subject's head. Acquisitions with metal artifact will not be accepted under any circumstances and a repeat scan will be requested.

Possible Remedy:
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.

Spin Echo Imaging

Example 1: Image Degradation due to Motion Artifact

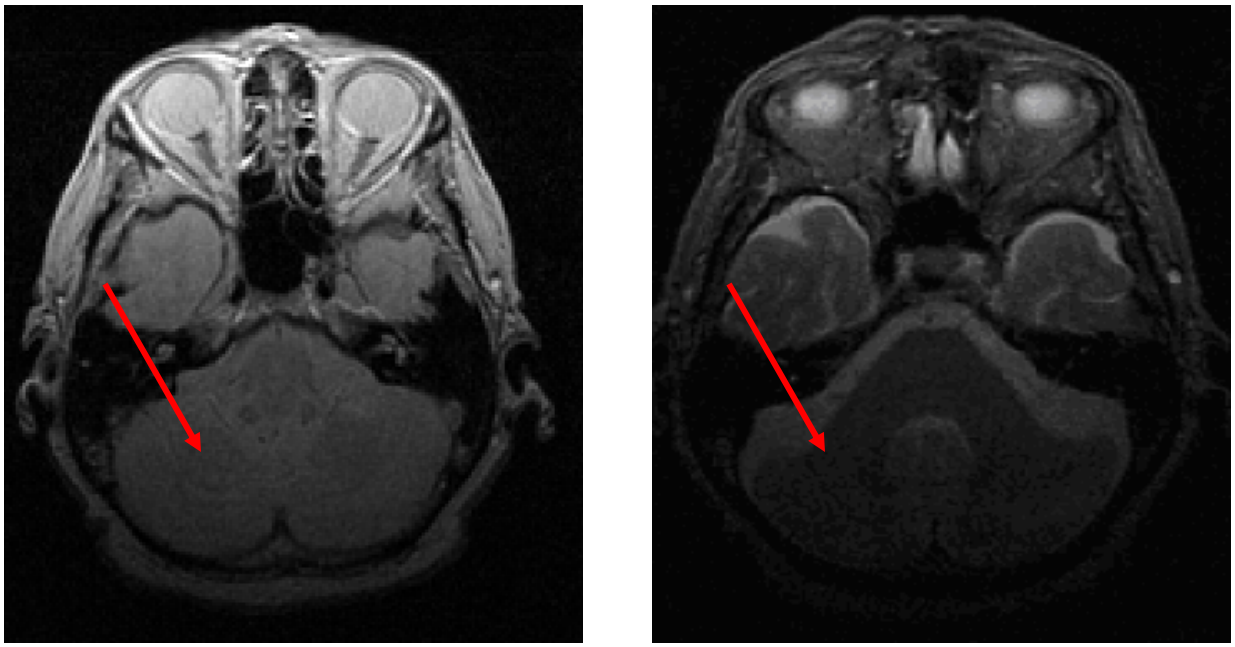




Problem:
In this example, movement has caused motion artifacts on the spin echo image. Acquisitions with major motion artifacts will not be accepted and a repeat scan may be requested.

Possible Remedies:
1. If motion is due to the subject's head moving, reacquire scan after tightly securing the subject's head with additional restraints and discussions with subject to hold their head still.
2. 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: Signal Loss at the Inferior Portion of the Brain



Problem:
In this example, the image has a loss of signal on the inferior slices of the brain due to incorrect positioning in the head coil. The subject was placed too low in the head coil. Please note the lack of contrast between gray and white matter on the most inferior slices of brain. 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.

Appendix 5: Data Transfer to Laboratory of Neuro Imaging (LONI)

LONI
Laboratory of Neuro Imaging
Image Archive Data Instructions

CONTENTS:

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.

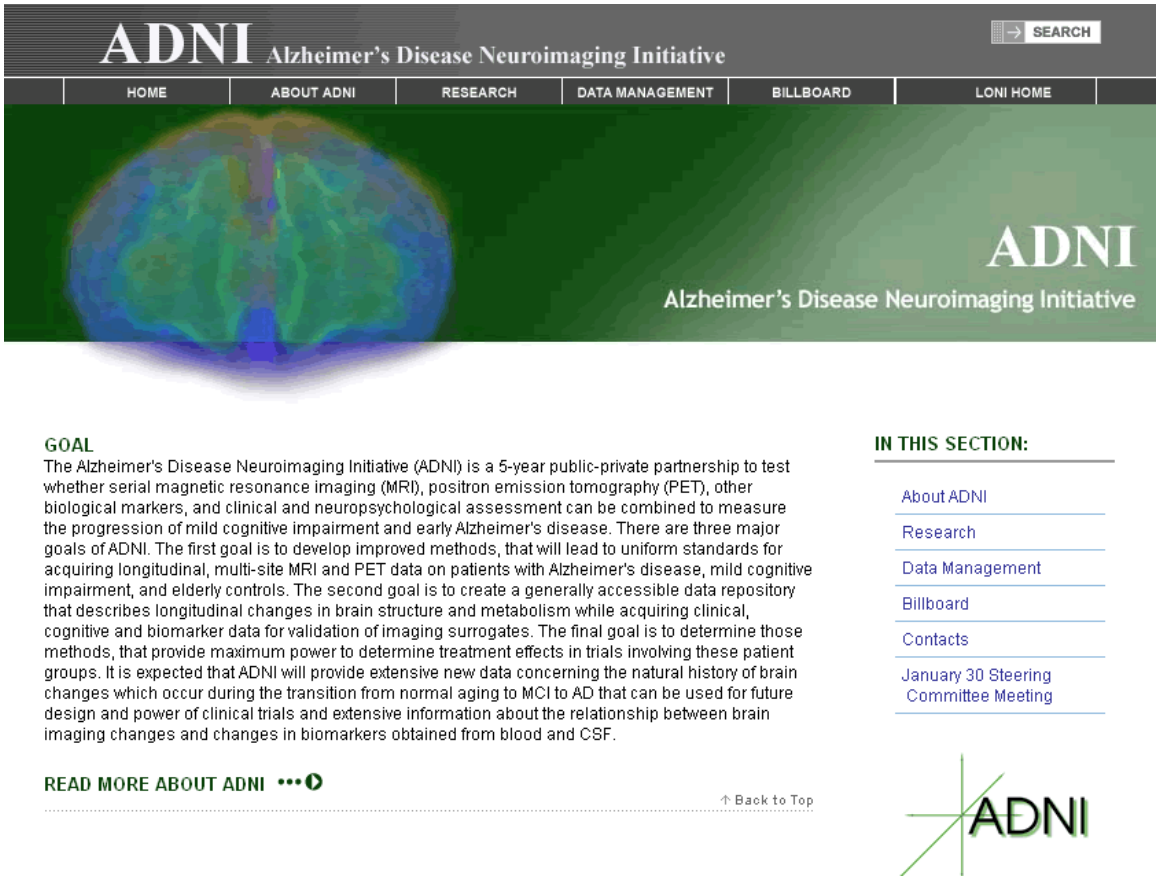
For questions or problems with the IDA please send e-mail to adni@loni.ucla.edu

B - SYSTEM REQUIREMENTS

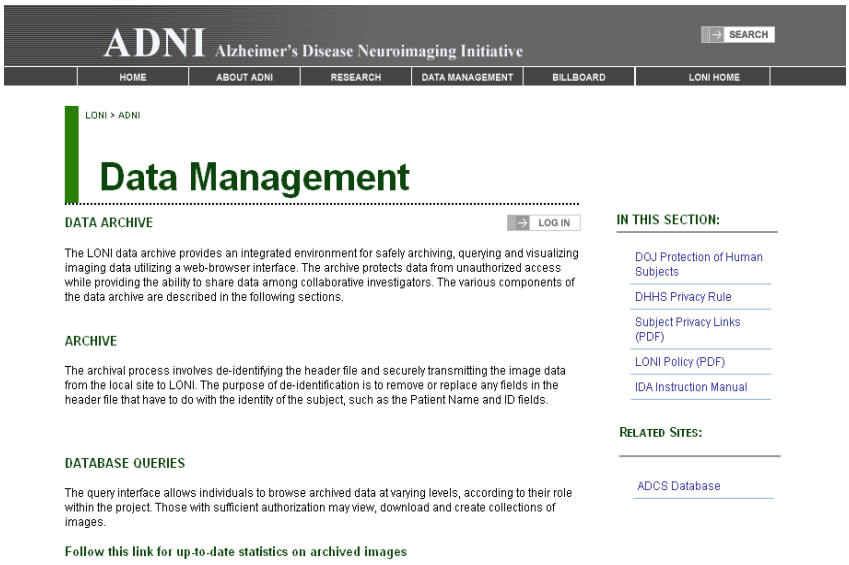
The IDA requires a newer web browser (IE, Netscape, Mozilla) with the Java 1.4.2 (or higher) plug-in.

C - USER REGISTRATION

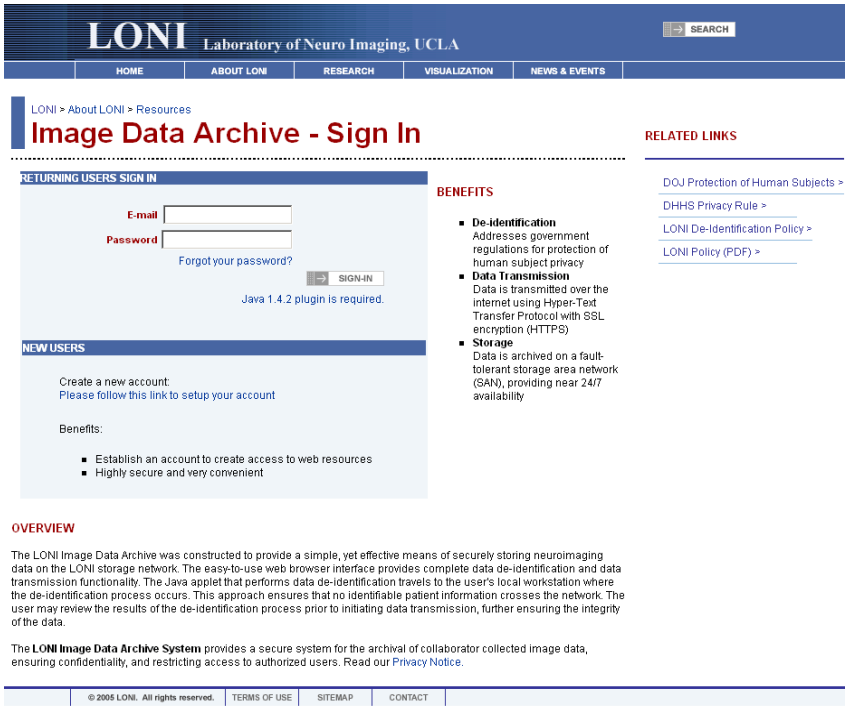
1. From the ADNI home page at http://www.loni.ucla.edu/ADNI/ click the data management link.



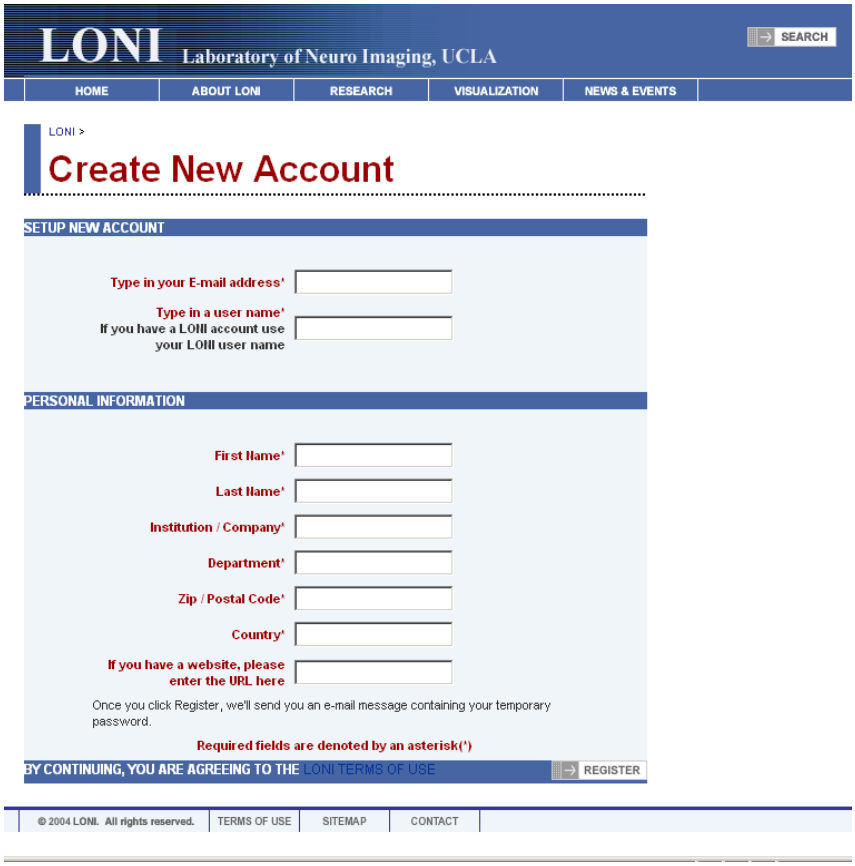
2. Click the Login button to archive files or query the database.



3. Click "Please follow this link to setup your account" to complete the user registration.

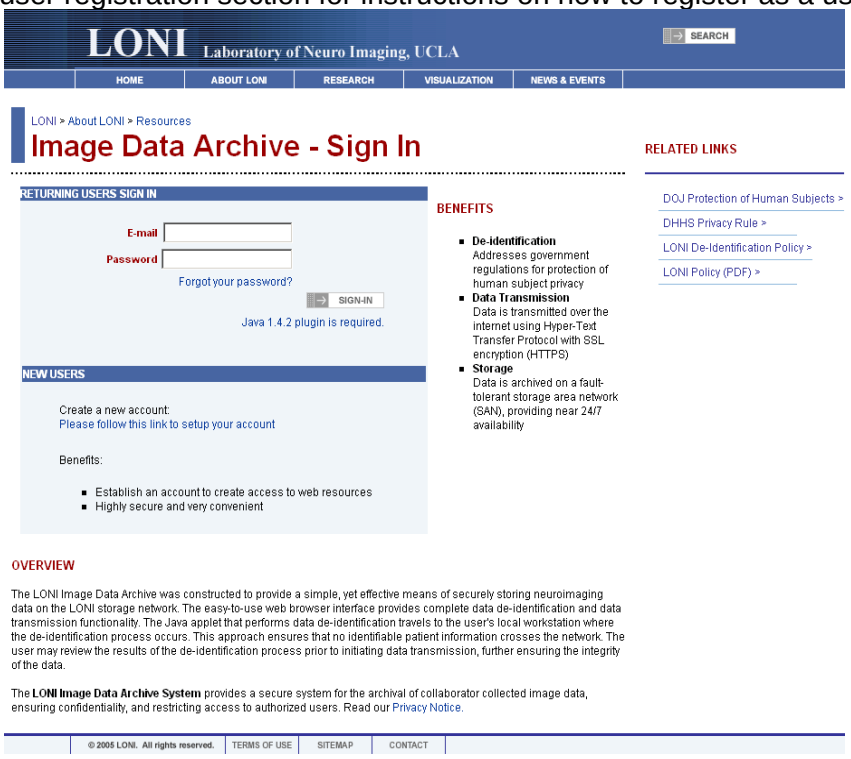


4. Complete the New Account form then press the Register button. Notify the LONI administrator (adni@loni.ucla.edu or dba@loni.ucla.edu) when you have registered so your access level can be set. You will receive an e-mail when this process is complete (within one business day).

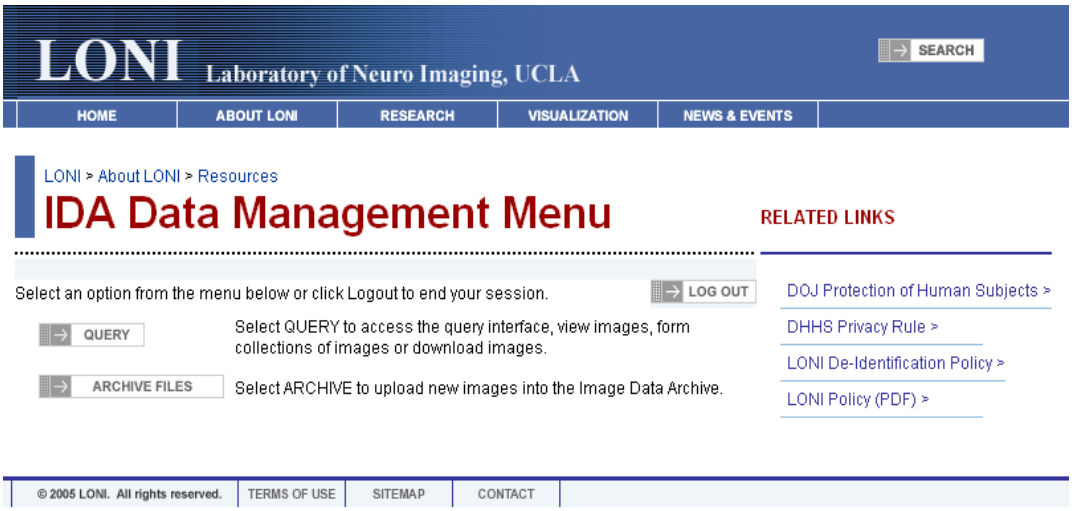


D – IDA LOG IN

From the ADNI home page http://www.loni.ucla.edu/ADNI/Data/index.shtml, 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.



From the IDA Menu page, click the Query button to view or download images, or the Archive Files button to upload images to the data archive.



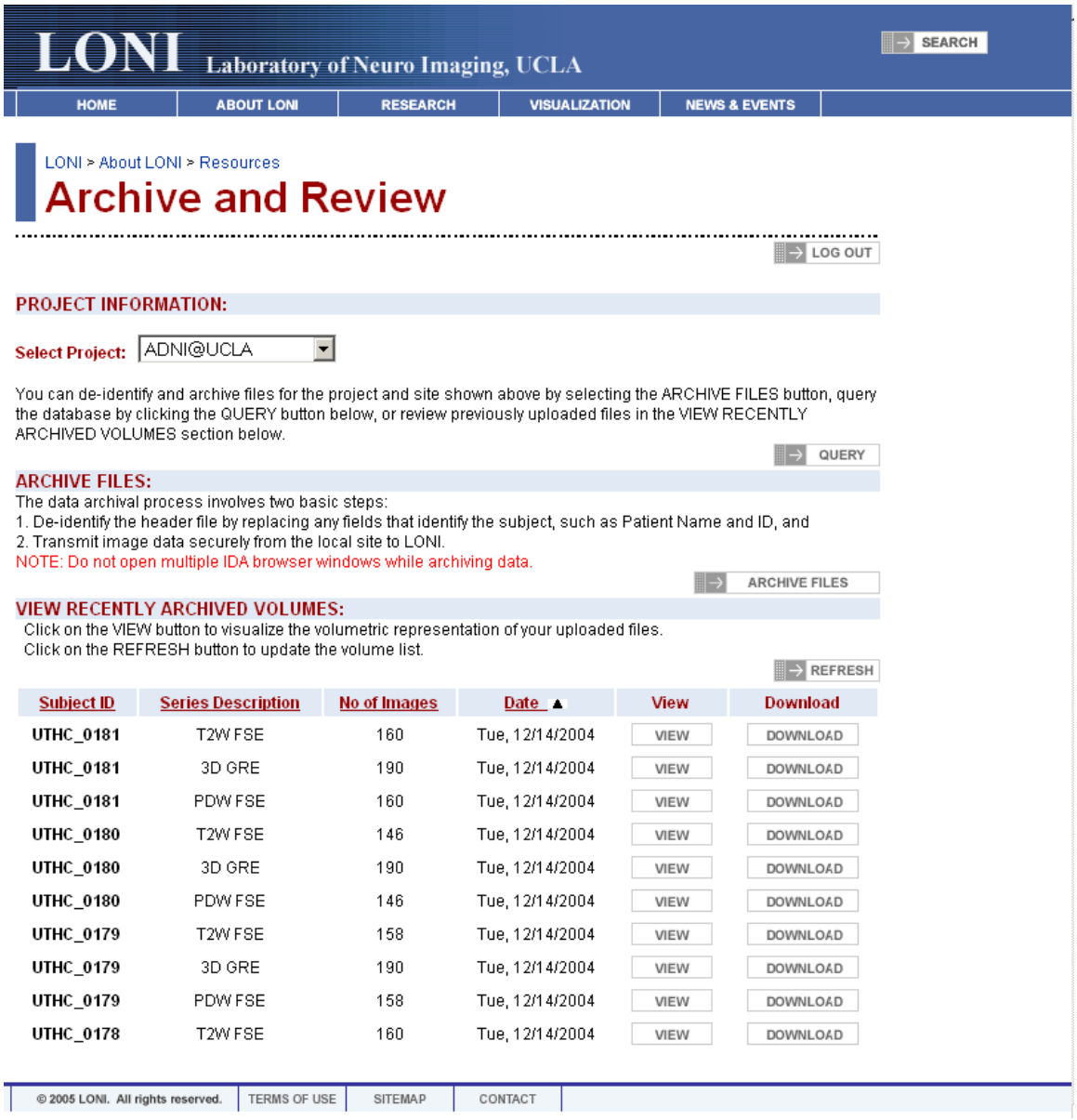
E - QUERY AND DOWNLOAD INSTRUCTIONS

Overview: The query interface allows the user to search for images based on subject and image-related criteria, view images, form image collections and download images in a number of file formats.

There are two ways to access the query interface:

E1) From the ADNI Data Management page, http://www.loni.ucla.edu/ADNI/Data/index.shtml, click the Login In button. On the IDA Data Management Menu, click on Archive Files.

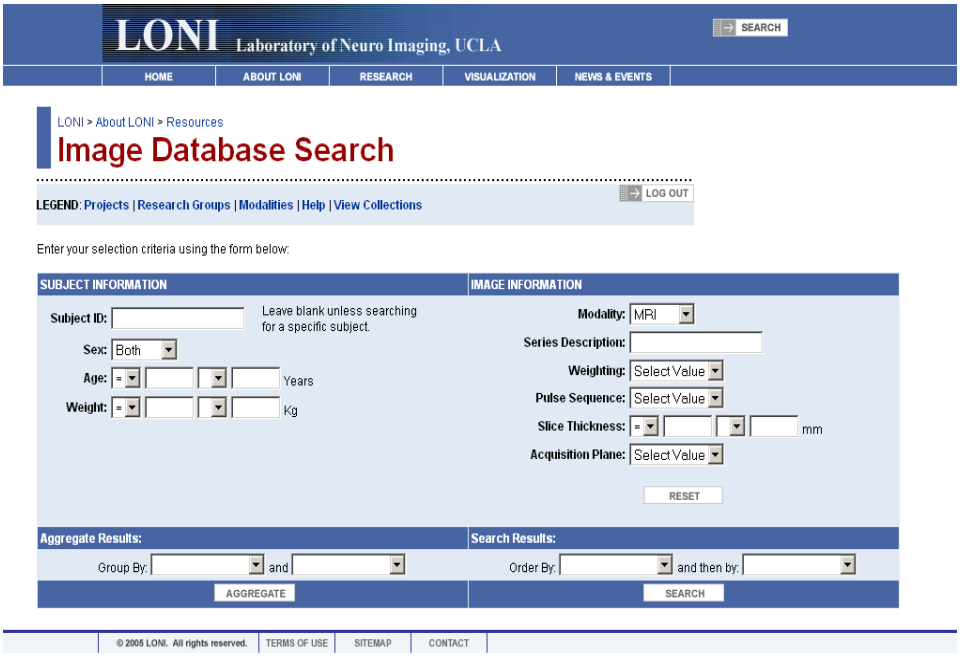
On the "Archive and Review" page, click the Query button.



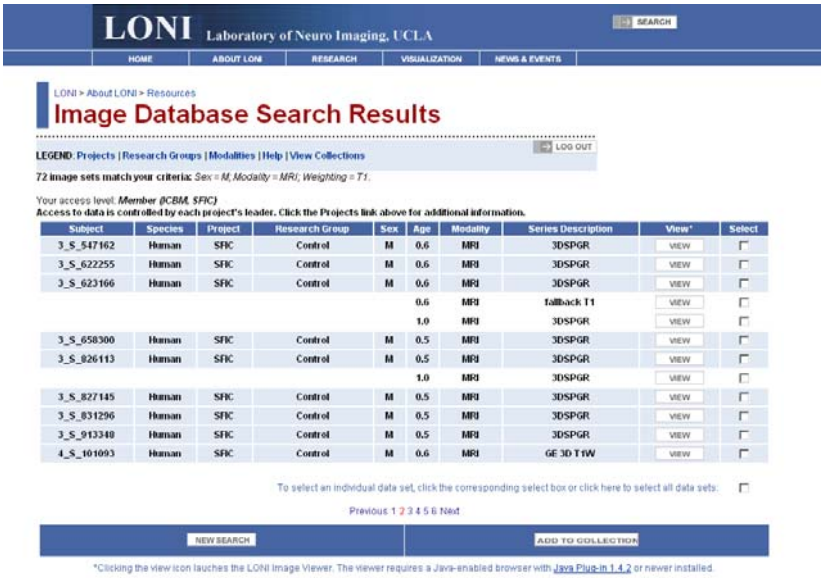
E2) From the ADNI Data Management page, http://www.loni.ucla.edu/ADNI/Data/index.shtml, click the Login button. Enter your e-mail address and password, and then click the Sign-In button.

On the IDA Data Management Menu page, click on the Query button.

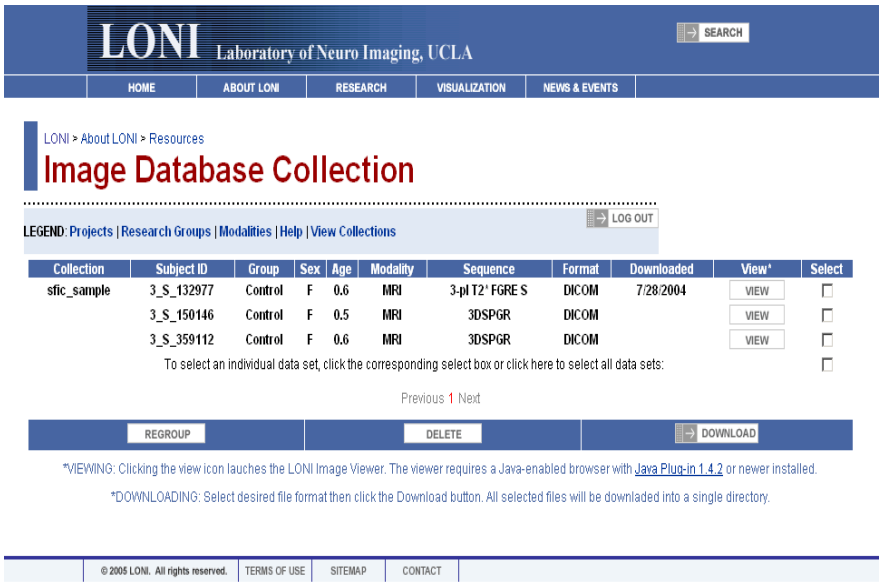
1. To perform a query, enter search criteria in the fields provided, and then click the "Search" button. Data can be queried based on a combination of subject- and image-related attributes.



2. Query results can be either aggregated and grouped or individually displayed and ordered as shown below.



3. Users may form collections of images for downloading. To create a collection, click the select box beside the desired image(s), and then click the "Add to Collection" button. When prompted, enter the collection name. A new window displaying the data collection will open. To download images, select the desired files and click the "Download" button.



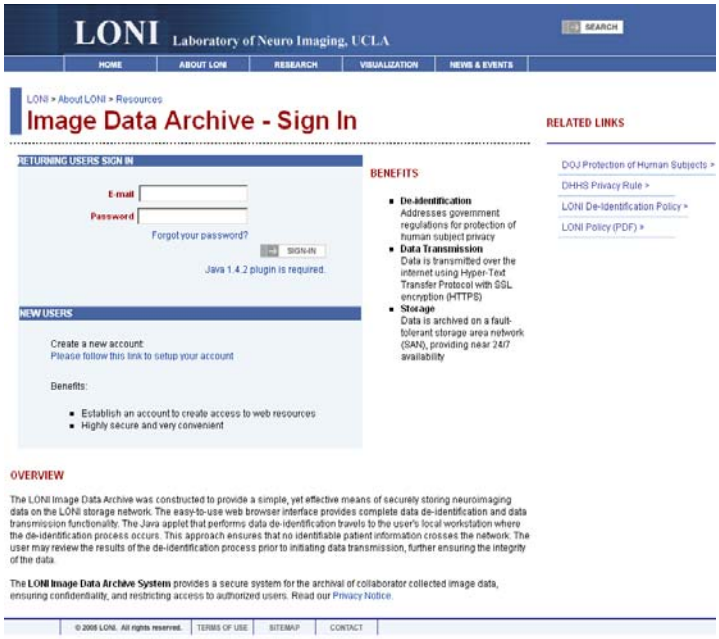
F – IMAGE ARCHIVE OVERVIEW

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.

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 ADNI Data Management page http://www.loni.ucla.edu/ADNI/Data/index.shtml. 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.



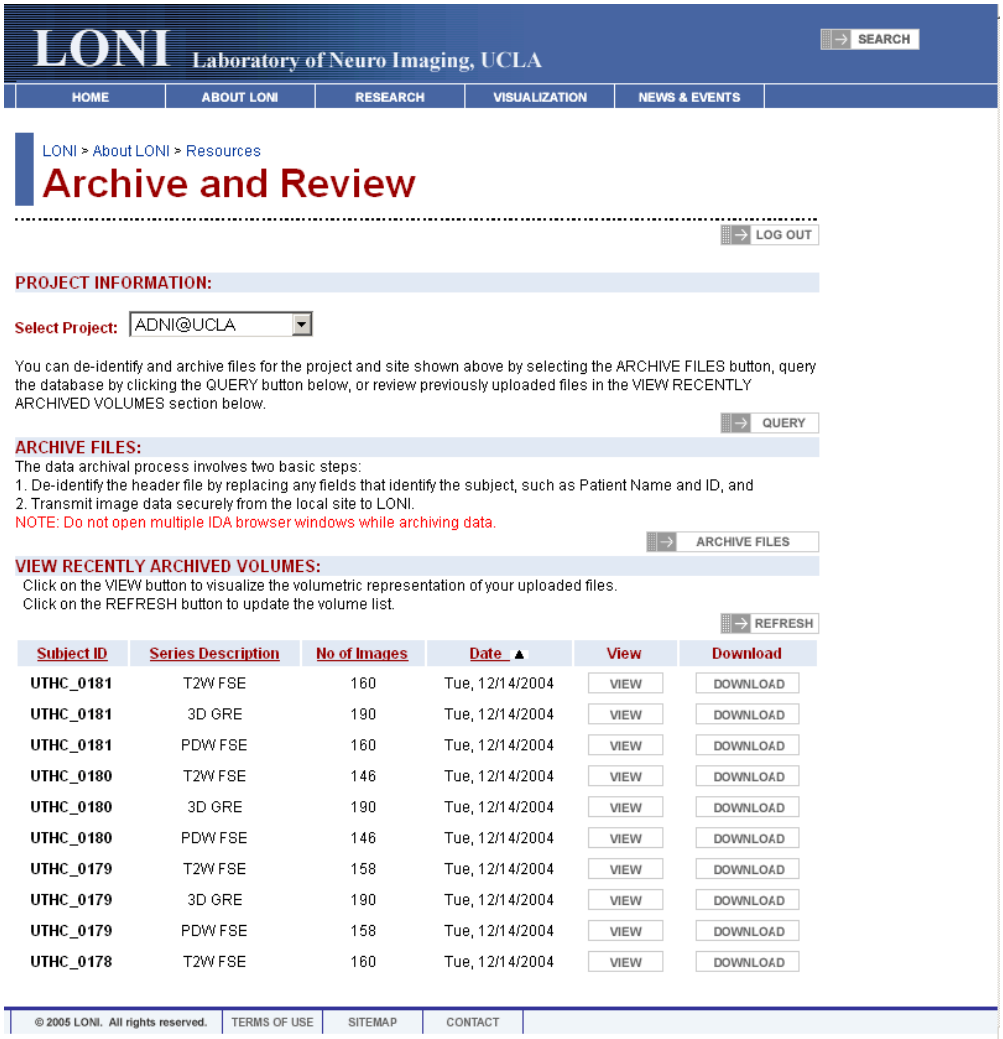
On the IDA Menu page, click the Archive Files button to upload images to the data archive.

G - ARCHIVE INSTRUCTIONS FOR ORIGINAL HEADERED FILES (DICOM)
The Archive and Review page is the starting point for uploading new images. The bottom portion of the page lists the last 10 images uploaded by the user.

SYSTEM REQUIREMENTS: The IDA requires a newer web browser (IE, Netscape, Mozilla) with the Java 1.4.2 (or higher) plug-in.

ASSUMPTIONS FOR MRI:
The image data is in DICOM format.
All image files are in a single directory per subject.
An empty directory exists for holding the de-identified files.

On the "Archive and Review" page, select your Project/Site from the drop down menu and click the "Archive Files" button. Do not open multiple IDA browser windows while archiving data.

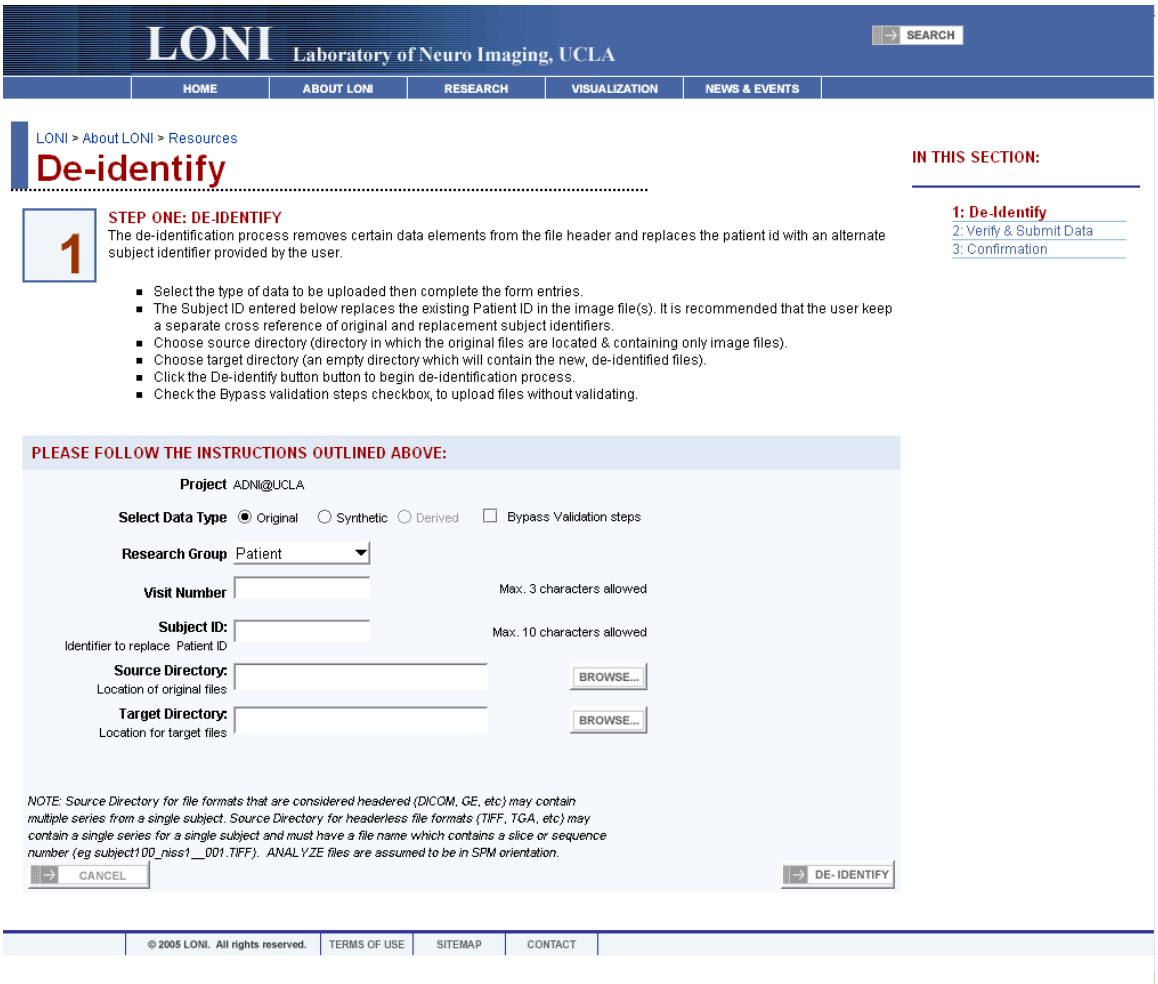


Step 1:
Select the data type: choose **Original**.

Complete the required information on the De-Identify page, making sure that a proper research identifier is supplied for the subject, then click the De-Identify button.

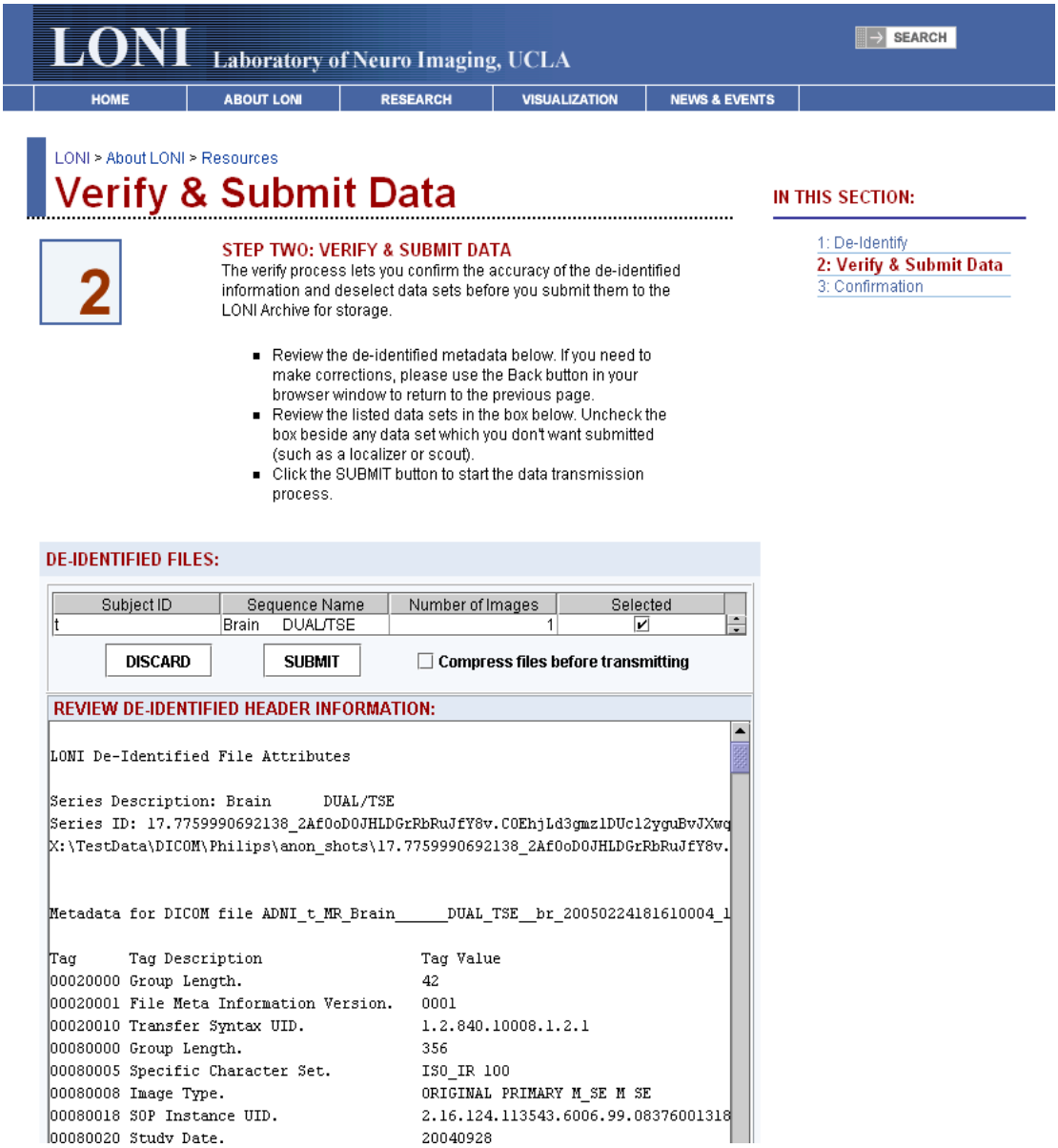
Choosing "Bypass Validation Steps" allows you to skip the validation of header attributes, and upload all series without further interaction, however the browser must remain open for the duration of the upload process.

Note: The directory containing the original data files may contain multiple series, however, all data within the directory must be from a single subject. The target directory, for holding the de-identified files must be empty.

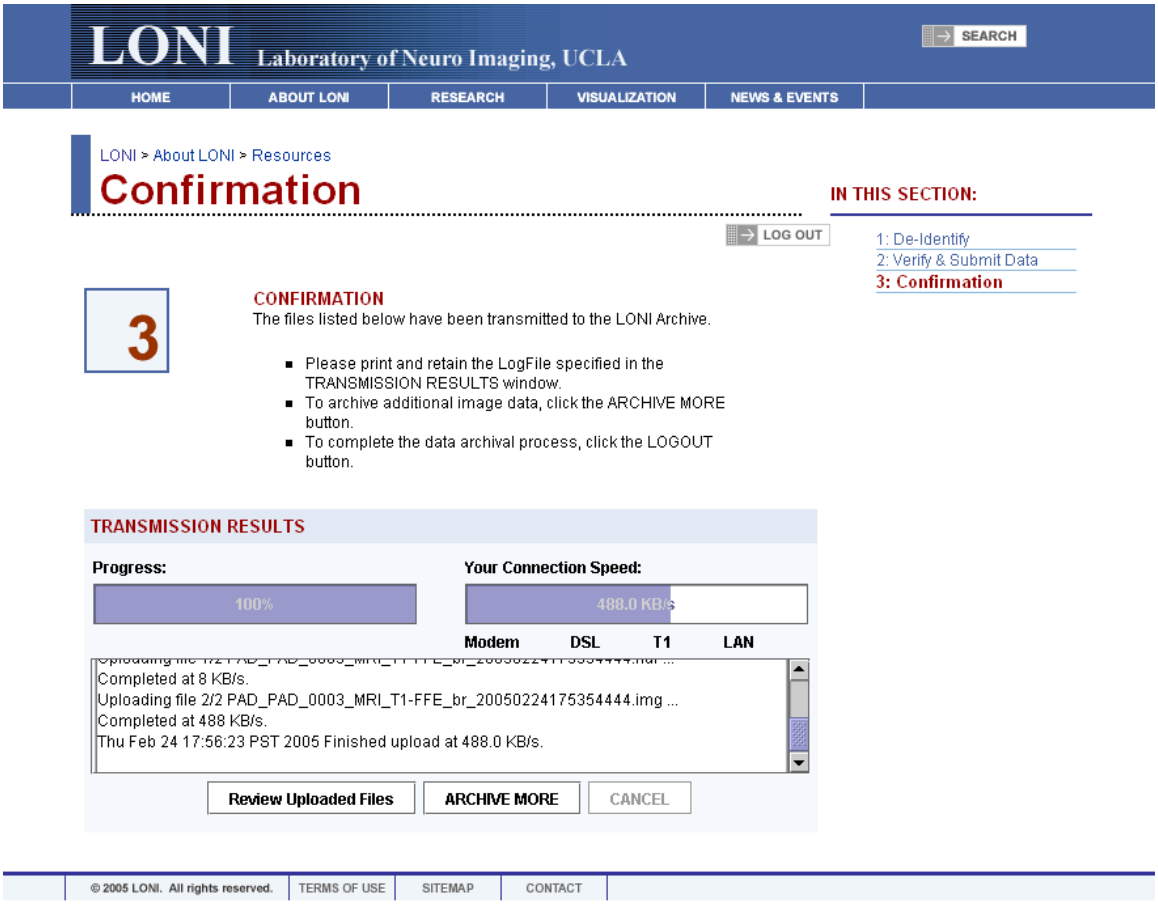


Step 2:
When the de-identification step is finished, a listing of the image series is shown along with information about the de-identified files.

Results of the de-identification can be viewed by scrolling down in the De-Identified Metadata window. After reviewing the metadata, de-select any series that should not be archived (scouts, etc). To compress files, click the associated checkbox (compressing files will speed the upload process for computers with slower network connections). Click the Submit button to archive the de-identified images or Discard to cancel the upload and return to the previous page.

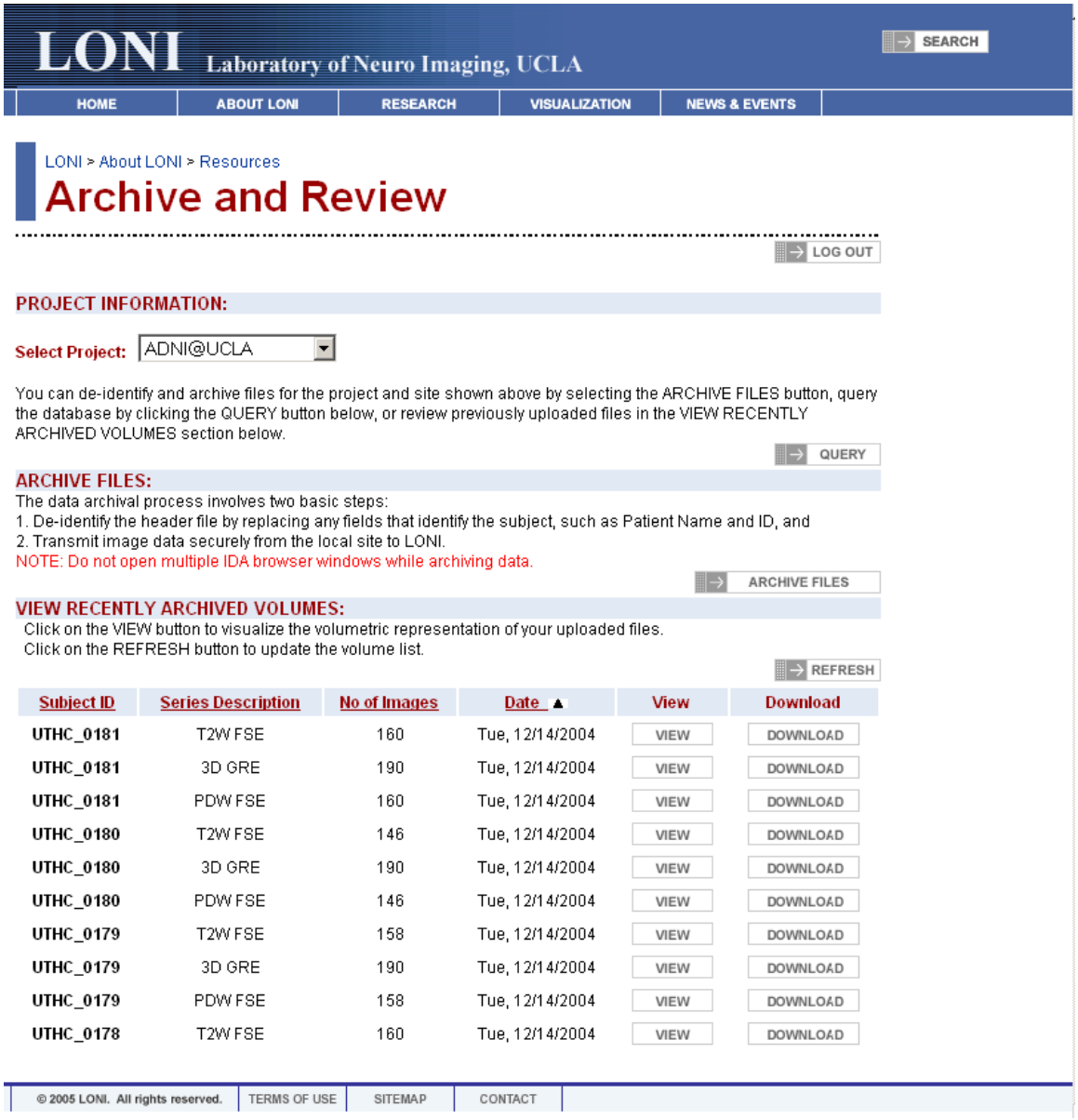


Step 3:
The progress bar will continually show the progress of the upload process. When the transmission is complete choose to Archive More files, Review Uploaded Files, or Log Out.



H - ARCHIVE INSTRUCTIONS FOR LIMITED HEADER FILES (Analyze, Minc)

1. On the "Archive and Review" page, select your Project/Site from the drop down Menu and click the "Archive Files" button. Do not open multiple IDA browser Windows while archiving data.

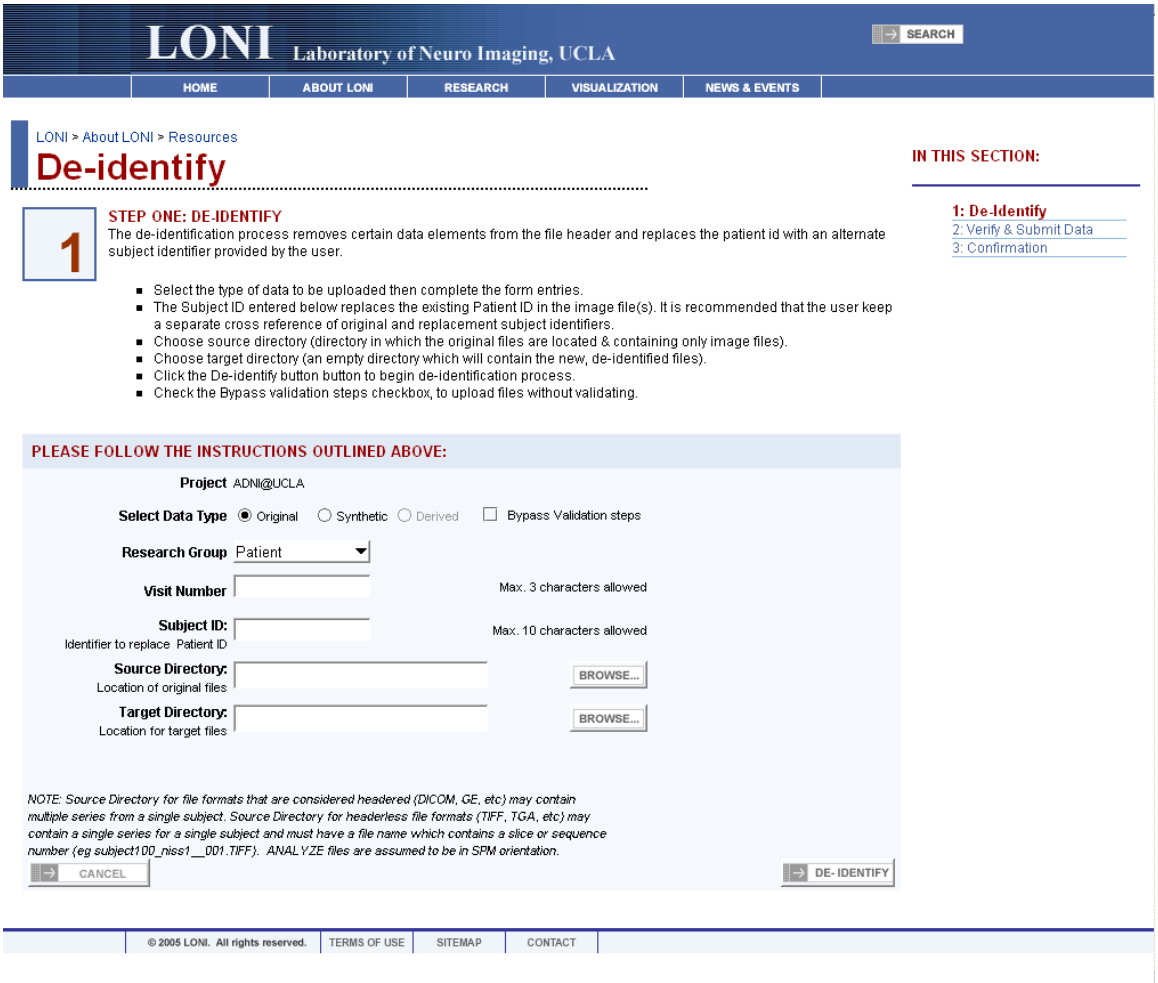


Step 1:
Select the data type: choose **Original**.

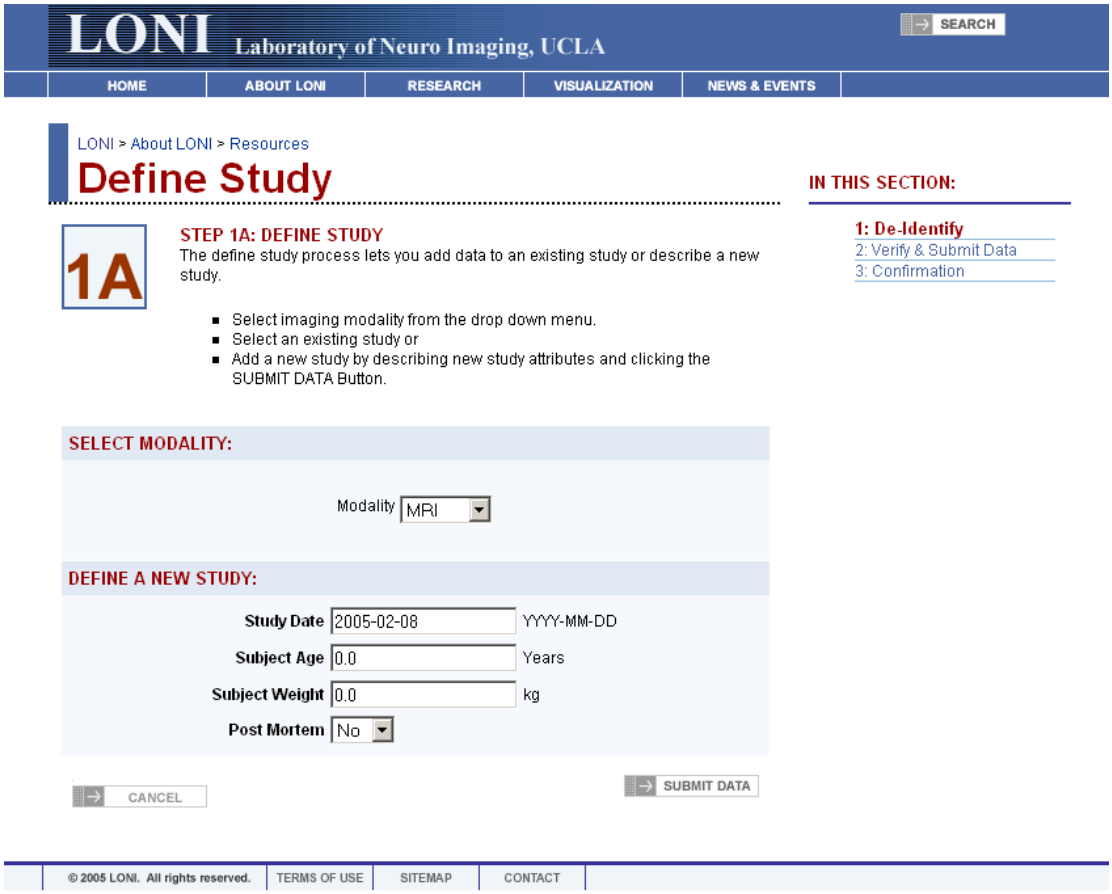
Complete the required information on the De-Identify page, making sure that a proper research identifier is supplied for the subject, then click the De-Identify button.

Choosing "Bypass Validation Steps" allows you to skip the validation of header attributes, and upload all series without further interaction, however the browser must remain open for the duration of the upload process.

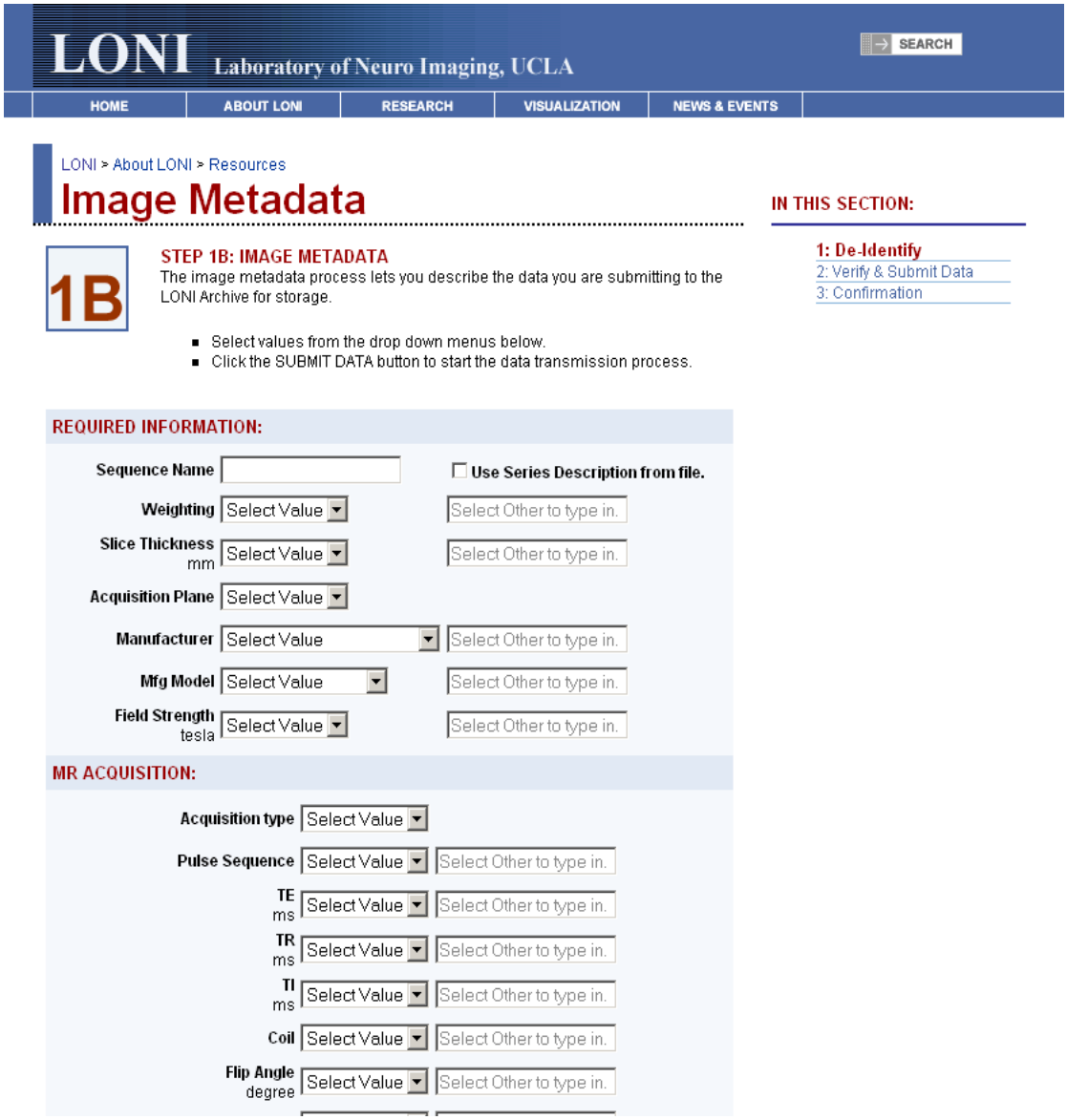
Note: The directory containing the original data files may contain multiple series, however, all data within the directory must be from a single subject. The target directory, for holding the de-identified files must be empty.



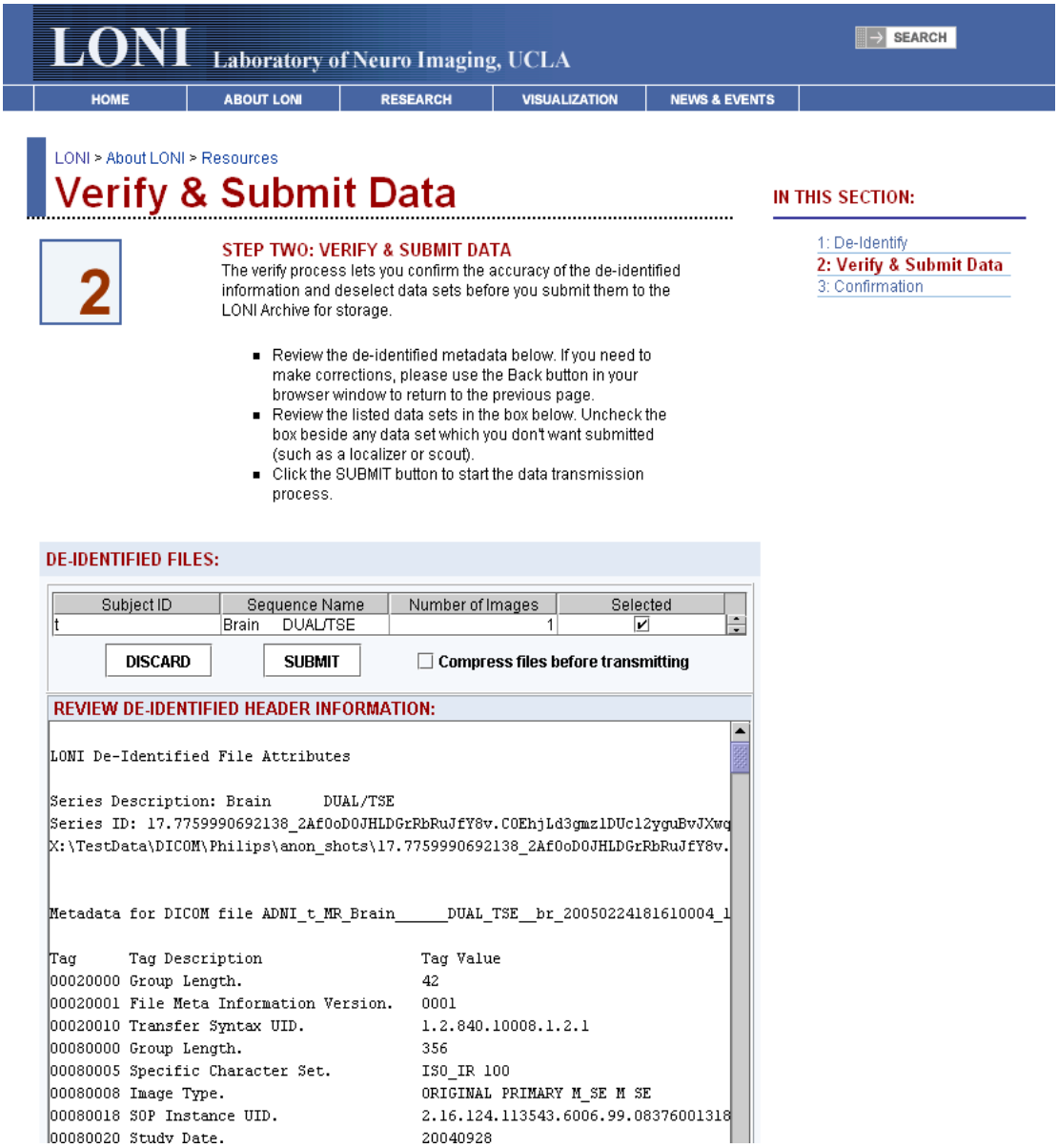
Step 1A:
Define the study. Select the imaging modality from the drop-down menu and provide the study information. Click the "Submit Data" button when finished.



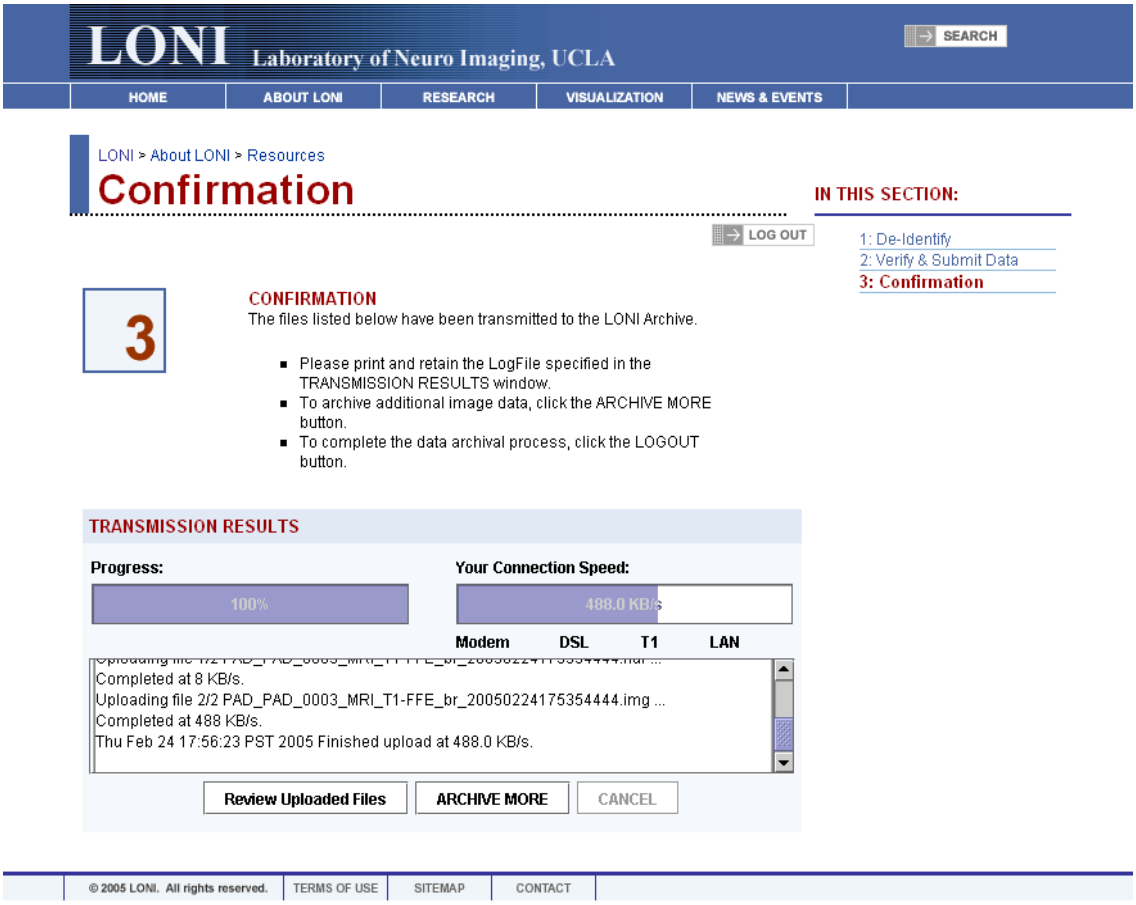
Step 1B:
Enter the Image Metadata, then click the Submit Data button to initiate the De-identification process.



Step 2:
When the de-identification step is finished, a listing of the image series is shown along with information about the de-identified files. Results of the de-identification can be viewed by scrolling down in the De-Identified Metadata window. After reviewing the metadata, de-select any series that should not be archived (scouts, etc). To compress files, click the associated checkbox (compressing files will speed the upload process for computers with slower network connections). Click the Submit button to archive the de-identified images or Discard to cancel the upload and return to the previous page.



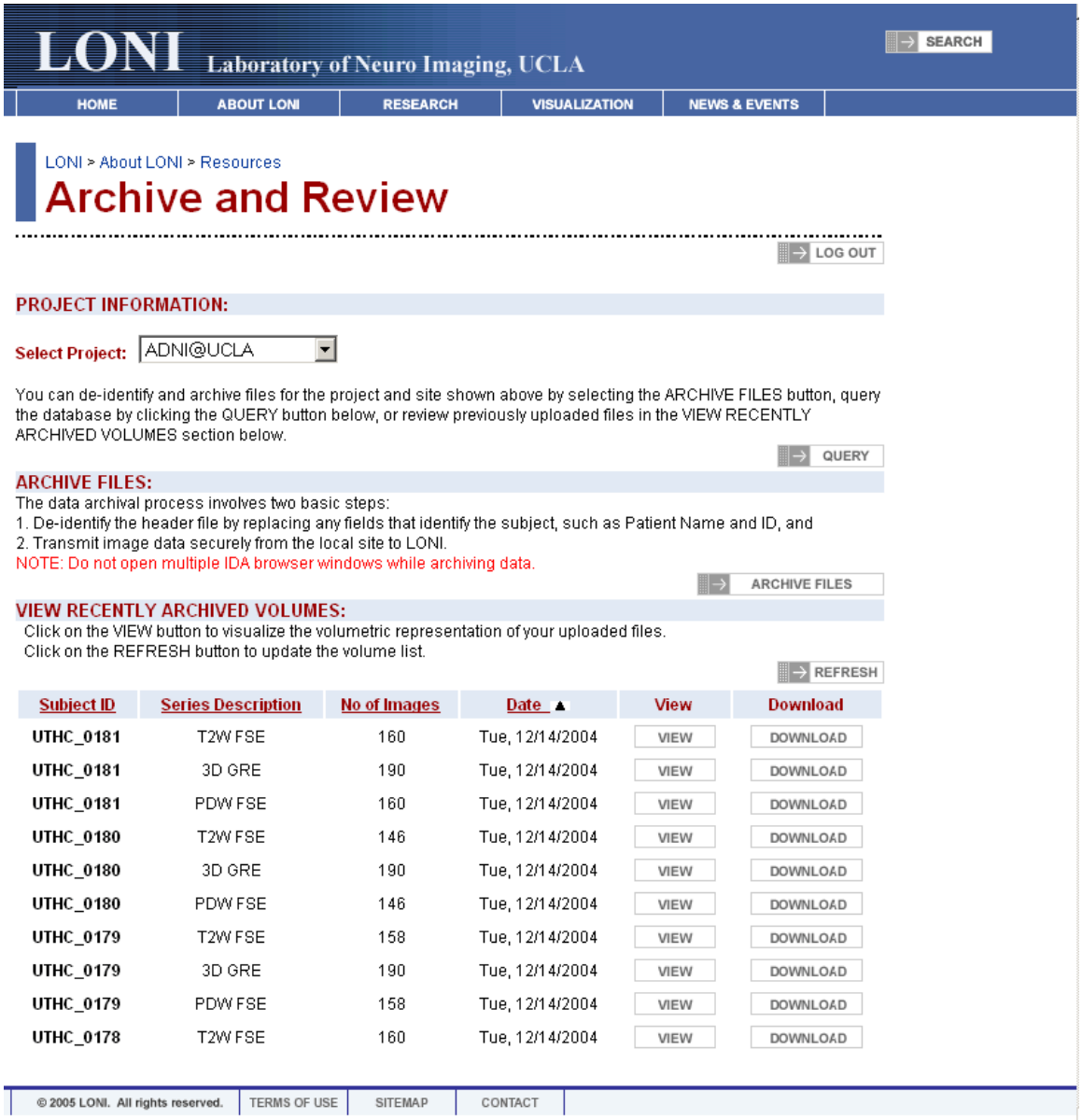
Step 3:
The progress bar will continually show the progress of the upload process. When the transmission is complete, choose to Archive More files, Review Uploaded Files, or Log Out.



I - ARCHIVE INSTRUCTIONS FOR SYNTHETIC DATA

Synthetic data can be uploaded only when the image(s) from which the synthetic image was created have already been uploaded to the LONI archive.

1. On the "Archive and Review" page, select your Project/Site from the drop down Menu and click the "Archive Files" button. Do not open multiple IDA browser windows while archiving data.

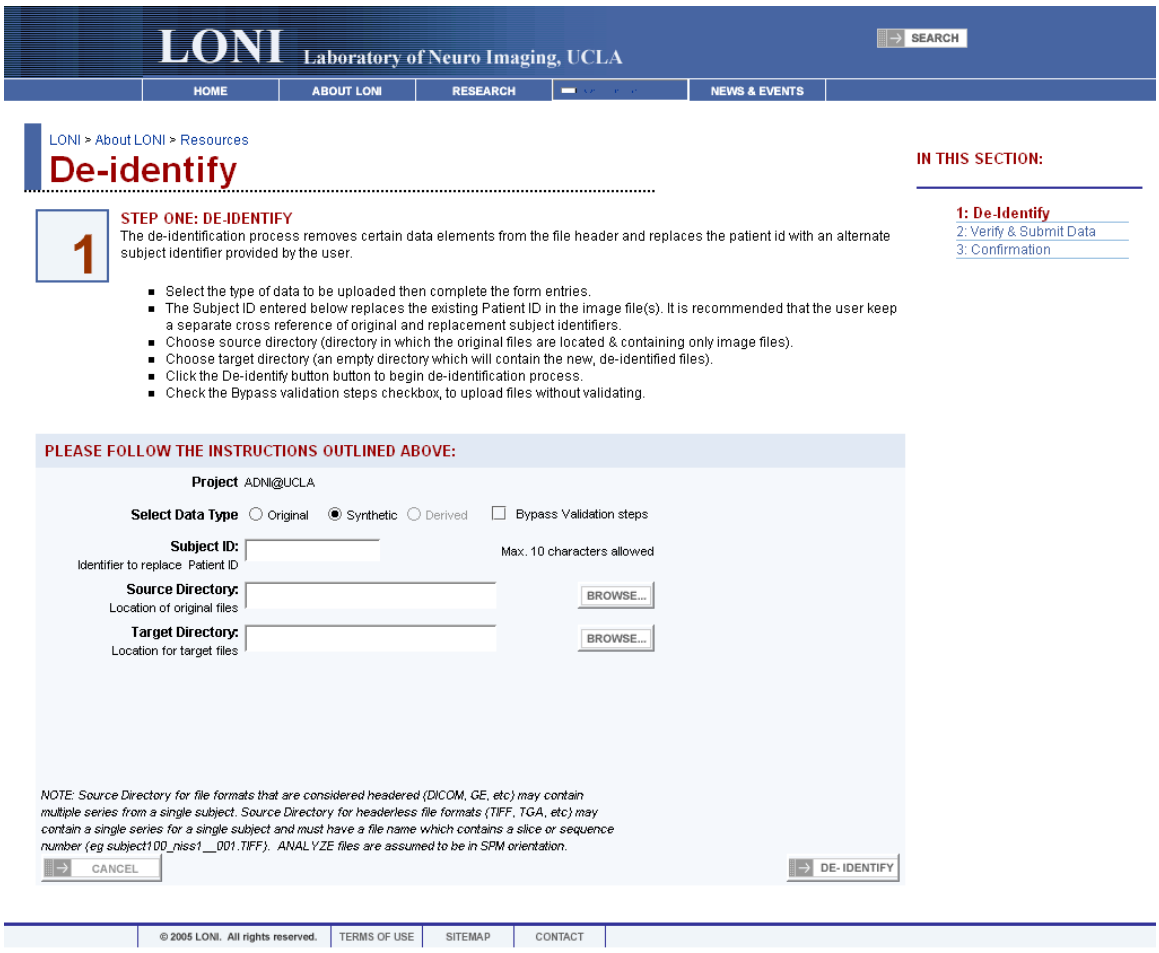


Step 1:
Select the data type: choose **Synthetic**.

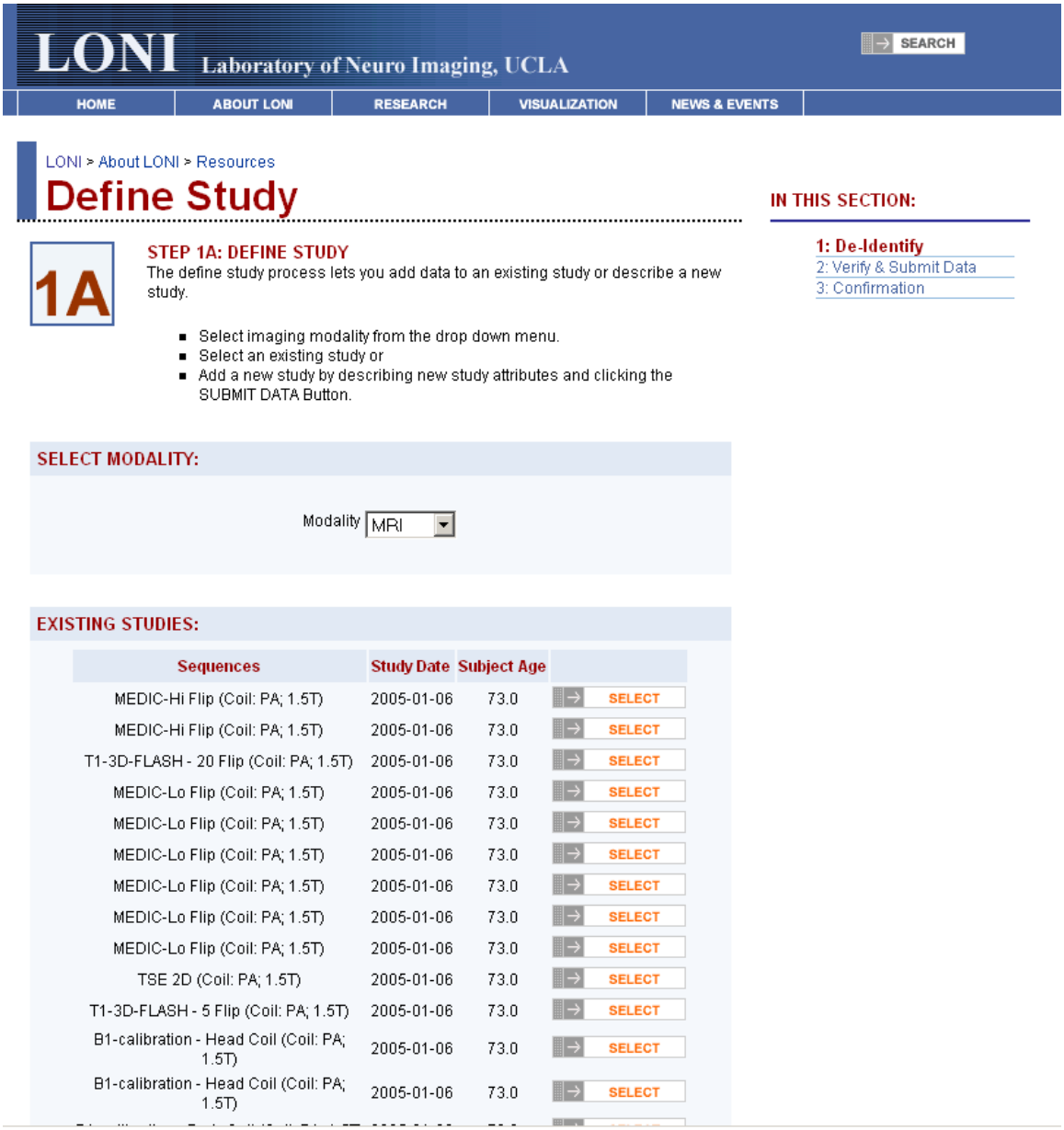
Complete the required information on the De-Identify page, making sure that a proper research identifier is supplied for the subject, then click the De-Identify button. Make sure that a research identifier for a previously archived subject is supplied. Specify the source and target directories. Click the De-Identify button.

Choosing "Bypass Validation Steps" allows you to skip the validation of header attributes, and upload all series without further interaction, however the browser must remain open for the duration of the upload process.

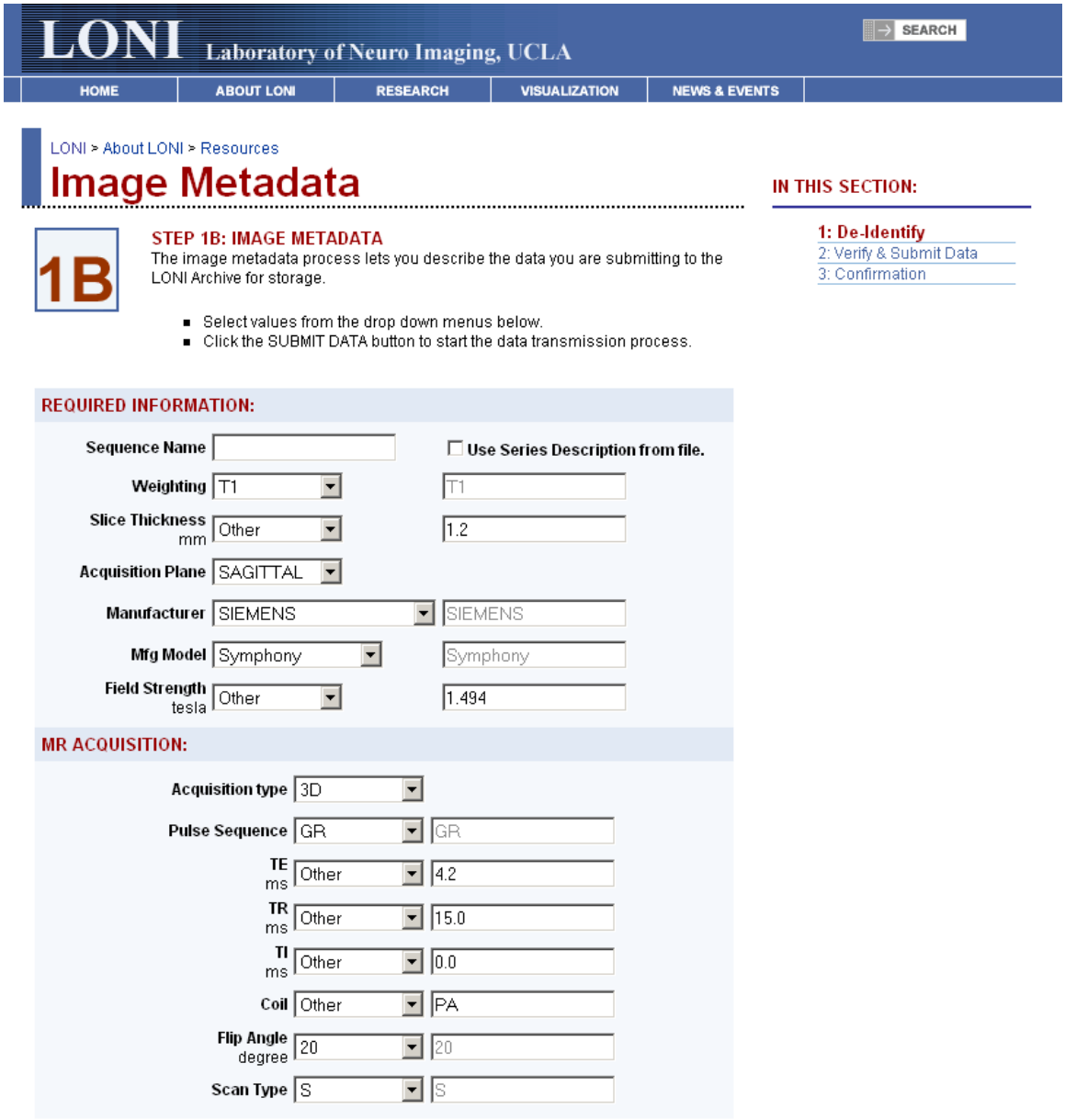
Note: The directory containing the original data files may contain multiple series, however, all data within the directory must be from a single subject. The target directory, for holding the de-identified files must be empty.



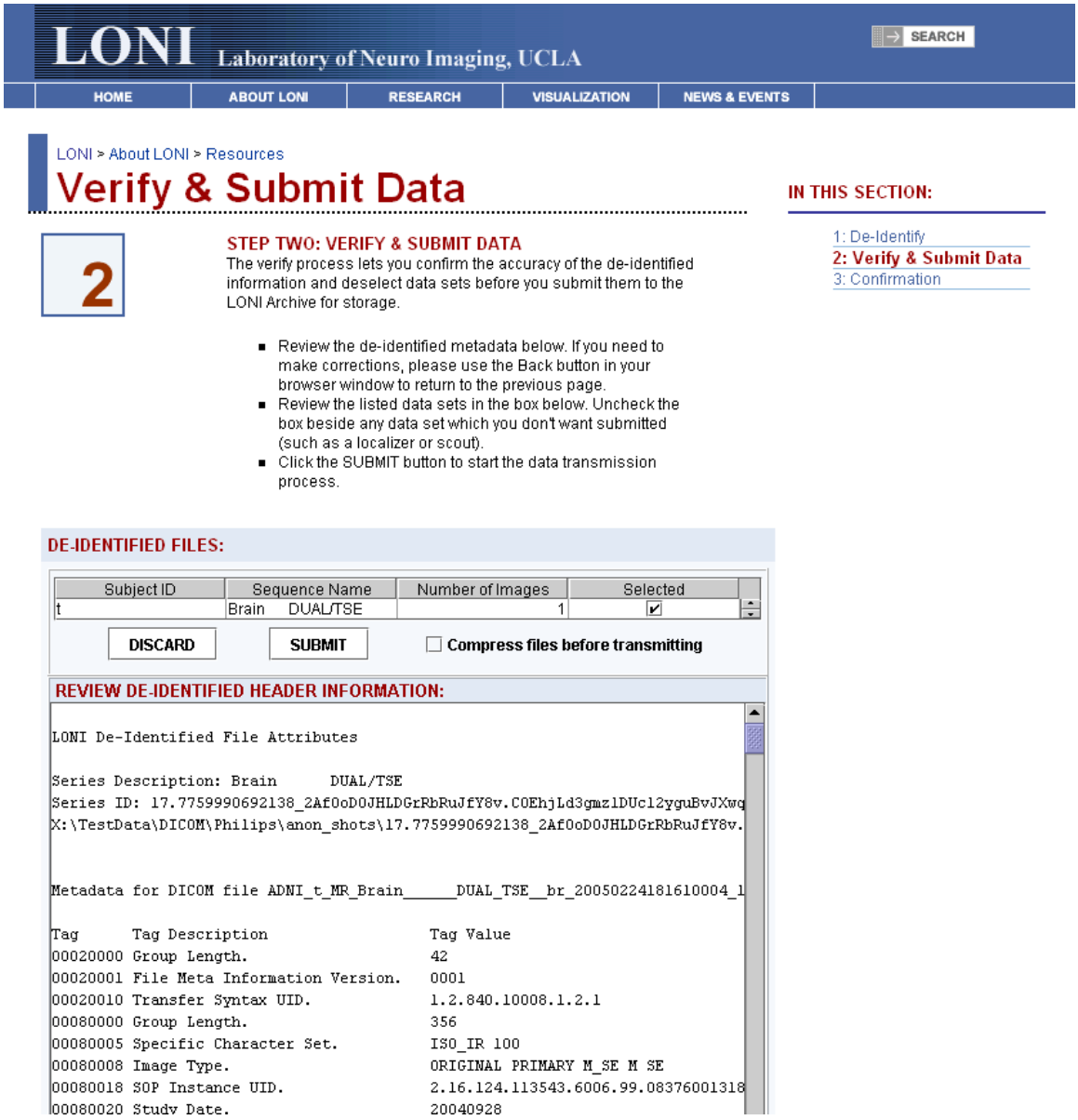
Step 1A:
Select the image modality from the drop-down menu. Choose the sequence from which the synthetic image was created by clicking the select box beside the sequence.



Step 1B:
Change metadata (if necessary) and enter a sequence name **or** click the "Use Series Description from file" checkbox to use the series description in the file header. Click the Submit Data button to initiate the de-identification.



Step 2:
When the de-identification step is finished, a listing of the image series is shown along with information about the de-identified files. Results of the de-identification can be viewed by scrolling down in the De-Identified Metadata window. To compress files, select the associated checkbox (compressing files will speed the upload process for computers with slower network connections). Click the Submit button to archive the de-identified images or Discard to cancel the upload and return to the previous page.



Step 3:
The progress bar will continually show the progress of the upload process. When the transmission is complete choose to either Archive More files, Review Uploaded Files or Log Out.