ADNI 2
PET Technical Procedures Manual: Florbetapir

As of May 9, 2014, no further FDG PET scans will be conducted under the ADNI 2 protocol.
Additionally, enrollment for the ADNI 2 early frames add-on study has been met and this sub study is closed. Please do not conduct any further early frame add-on sequences, even if participants have been consented.
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General Information

ADNI 2 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 purpose of this manual is to further explain the PET imaging component of the ADNI2 protocol. Standard procedures are needed to ensure consistency of data collection in this longitudinal study.

This manual contains information for study-site clinical staff involved with the care of study subjects during the imaging procedure and those involved with the processing and transfer of PET imaging data.

As of May 9, 2014, no further FDG PET Scans will be conducted under the ADNI2 protocol. Enrollment for the ADNI2 early frame add-on study has been met and this sub study is closed. Please do not conduct any further early frame add-on sequences, even if participants have been consented.

A florbetapir PET scan must be completed within 2 weeks before or 2 weeks after the in-clinic assessments at two-year intervals through the life of the ADNI2 grant for CN, SMC, EMCI and LMCI cohorts, as well as for roll over subjects from ADNI1 and ADNI-GO.

Note that this manual uses the generic chemical name of florbetapir which was previously referred to in earlier documentation, and elsewhere in the ADNI protocols, as AV-45.
Contact Information

If you have any questions or concerns regarding the florbetapir PET imaging protocol please contact

adnipet@ucsd.edu

If you have any specific questions regarding florbetapir ordering please contact:

clinicalsupply@avidrp.com

If you have question regarding the scan uploading to the LONI website please contact

adni@loni.usc.edu

If you have any questions or concerns regarding individual subjects please contact the study coordinator at your referral site.
Site Qualification

PET Scanners

It is preferable for sites to use existing qualified ADNI scanners for PET imaging. If a new scanner must be introduced it will need to be qualified using standard ADNI scanner qualification before imaging can be performed.

Ideally, no hardware or software upgrades of the PET imaging system should occur during the duration of the study. In the event of such an upgrade, we ask that you inform the PET core prior to the anticipated upgrade. Depending on the nature of the upgrade the site may be asked to repeat the phantom scans prior to scanning any additional subjects.

Contact adnipet@ucsd.edu prior to imaging if a new scanner will be used for ADNI2 or if hardware / software upgrades have occurred.

Regulatory

Sites must be appropriately licensed through appropriate state or federal agencies to receive and use florbetapir prior to imaging.

Sites must also receive both IRB approval and radiation safety committee (RSC) or radioactive approval, before scanning any subjects.

Continued Quality Monitoring During Execution Phase

To ensure scanner/ancillary equipment stability and quality throughout the project, each site is required to perform ongoing quality control procedures.

Dedicated PET Scanner:

- PET scanner should have an up to date calibration and normalization on the date of each imaging session.

- A daily QC/blank scan (empty port transmission) scan should be done at the beginning of the day the scanning is to be completed. This scan should be
visually inspected for abnormalities. If there is a possibility that the abnormality could impact the quality of the PET scan the study should be rescheduled.

**PET/CT Scanner:**

- PET scanner should have an up to date calibration and normalization on the date of the imaging session.

- A daily QC check should be done at the beginning of the day the scanning is to be completed. This scan should be visually inspected for abnormalities. If there is a possibility that the abnormality could impact the quality of the PET scan the study should be rescheduled.

- Daily CT should be performed as recommended by the specific vendor, but typically should include a "checkup/calibration" procedure and a water phantom scan. The checkup/calibration procedure guarantees optimum image quality by warming up the x-ray tube and should be performed at startup and within 1 hour prior to any scan. The water phantom provides quality measurements of 3 parameters. The parameters are the CRT value of water calculated in Hounsfield units (HU), the pixel noise of images calculated as a standard deviation, and the tube voltages measured directly on the x-ray tubes. These three measurements should be determined for all available kVp values.

**Ancillary Equipment:**

- Quality control of dose calibrator should be performed throughout the course of the study. This typically will include daily constancy, quarterly linearity and annual accuracy.
PET Pre-Scan Procedures / General Information

Subject’s Pre-screening

All subjects should have been screened by the study coordinator for the following contraindications

- Inability to cooperate/claustraphobia (sedation is not offered for this protocol)
- Inability to lie on the scanner bed for 40 minutes
- Total radiation dose exposure to the subject in any given year exceed the limits of annual and total dose commitment set forth in the US Code of Federal Regulations (CFR) Title 21 Section 361.1.

Florbetapir Ordering

Study coordinators and PET technologists will need to reference the Avid Radiopharmaceuticals, Inc. Clinical Supplies Guidance Document (CSGD) for all relevant documents regarding ordering, shipping and receiving unit doses of florbetapir. Study coordinators will coordinate florbetapir ordering with the PET imaging facility using the florbetapir drug request form (DRF). Doses typically require a minimum of a 5 day notification prior to the desired day of imaging to coordinate production and delivery. The Avid clinical supply manager will work with the study coordinator to ensure a comparable injection time is agreed upon.

Subject Preparation

FDG Scans:
As of May 9, 2014, no further FDG PET scans will be conducted under the ADNI 2 protocol.

Florbetapir Scans:
There are no specific dietary restrictions for the florbetapir PET scans.

Subject Positioning

Proper subject positioning is a key aspect of the successful completion of the florbetapir PET exam. It is important to take the time necessary to ensure not only that the subject is properly positioned but also can comfortably maintain that position throughout the duration of the scanning session. Excessive motion and in particular a difference in
the subjects’ position between the emission scan and the transmission (or CT) scan used for attenuation correction is the single most common cause of failed studies.

- Have the subject remove any bulky items from their pockets such as billfolds, keys, etc. In addition, they should remove eyeglasses, earrings, and hair clips/combs if present. If possible they should try and remove hearing aids also.

- Position the subject so that their head/neck are relaxed. It may be necessary to add additional pads beneath the neck to provide sufficient support. Use the lasers to ensure there is little or no rotation in either plane. The head should be approximately positioned such that the PET scanning planes are parallel to the imaginary line between the external canthus of the eye and the external auditory meatus (orbitomeatal plane) and the head is centered in the sagittal plane.

- Use support devices under the back and/or legs to help decrease the strain on these regions. This also will assist in the stabilization of motion in the lower body.

- Once the subject has been positioned foam pads can be placed alongside the head for additional support. Velcro straps and/or tape should also be used to secure the head position. Vacuum bean bags can also be used in this process.

- If using a dedicated PET system it is helpful to perform a short emission or transmission scan to determine optimal axial position.

- The subjects should be offered a “panic button” or be reassured that someone is watching or able to hear them at all times.

- Proper positioning of the subject to get the entire head in the field of view is critical to the success of the project.

- Checking the subject positioning and readjusting (if possible) the position of the subjects’ head should be done often throughout the study.

Ambient Conditions

**FDG Scans:**
As of May 9, 2014, no further FDG PET scans will be conducted under the ADNI2 protocol.
Florbetapir Scans:
Standardization of the environment during the 50 minute uptake period following florbetapir administration is not essential.

Image File Identification

It is VERY important that each site follow standard file identification so that all scans can be easily identified. The file ID will be assigned by the Clinical Study Coordinator at the clinical site prior to the PET visit. The naming convention is SSS_C_#### where SSS is the three digit site ID, C is either S (subject) or P (phantom), and #### is the unique four digit number assigned by the site. For example, 129_S_0012 is the 12th subject enrolled in ADNI 2 and is from site 129.

Additionally please ensure in the series description, the type of scan is identified being florbetapir. Also ensure the header information is complete for each and every scan.

Documentation

The study coordinator must ensure the PET Technologist has a copy of the Florbetapir PET Scan Information Forms prior to each scan session. Be sure to complete the metadata sheet as the study is being acquired. A process should be established for transferring this form(s) back to the study coordinator. The study coordinator will then need to ensure the appropriate data is entered online within 24 hours of the scan.

Assessments and Endpoints for Florbetapir Scan:

The following assessments will be performed for all florbetapir subjects:

- Informed consent for ADNI 2 study;
- A 370 MBq (10 mCi +/- 10%) bolus injection of florbetapir will be administered (saline should not be added to the dose prior to administration).
- All subjects will have a 20 minute continuous brain PET imaging will begin approximately 50 minutes post-injection.
- Depending on the type of scanner, the subject should be placed on scanning table to permit enough time to obtain a CT scan and then begin the emission acquisition on time for the standard sequence. PET-only systems will acquire a transmission scan following the emission acquisition.
All images will be reconstructed immediately after the standard scan, and if a significant motion artifact is detected, another 20 minute continuous scan will be acquired. If there is a repeat scan, a second transmission scan can be done after the emission acquisition, PET/CT scans will precede the acquisition with a CT scan for attenuation correction.

During the imaging session subjects will be observed continuously for signs of adverse events or serious adverse events.

The injection site will be observed for excessive inflammation or damage to the surrounding tissue.

Follow-up Post Florbetapir Administration:

In the event of a sterility failure during the florbetapir synthesis:

Avid will have the following plans for notification and follow-up of a possible sterility failure:

- Avid will notify the investigator immediately when the sterility test of a dose of florbetapir injection shows growth (possible failure).
- Avid will conduct a sterility test failure investigation (which may take up to two weeks).
- Avid will notify the investigator of the outcome of the sterility test failure investigation (confirmed sterility failure and microbial identification or invalidated first test with a negative retest).

Avid recommends diligent monitoring of subjects who have received a dose having a possible failing or confirmed to have a failing sterility test result. The investigator should exercise appropriate medical judgment regarding treatment for possible or actual infection.
PET Imaging Protocols

Florbetapir Administration:

- Have the subject use the restroom and empty their bladder.
- Allow them to lie comfortably in a bed or reclining chair in a room. Supply them with blankets/pillows as needed to maximize their comfort.
- Obtain intravenous access using a small angiocath.
- Inspect the radiopharmaceutical dose solution prior to administration and do not use it if it contains particulate matter or is discolored.
- Using aseptic technique and radiation shielding, draw 370 MBq (10 mCi +/- 10%) of florbetapir and assay with a dose calibrator. Record the assay time to the nearest minute. Do not q.s. (add saline) to the dose prior to administration. Adding saline could potentially lead to precipitation out of solution form.
- Inject the florbetapir through a short intravenous catheter (approx. 1.5 inches or less) as a single intravenous bolus. Follow the injection with an intravenous flush of 0.9% sterile sodium chloride. Record the injection time to the nearest minute. The IV line can be discontinued at this time.
- Re-assay the dose syringe. If the residual activity is 0.1 mCi or greater, record the amount and correct the amount of the injected dose for the residual activity.

Florbetapir Sequence:

- Allow the subject to rest comfortably in the room for approximately 30 minutes for the incorporation of florbetapir into the brain.
- At the end of the 30 minute incorporation period, have the subject use the restroom and empty their bladder.
- Position and secure the subject in the scanner using methods previously described. Alignment marks should be put on the subject using the laser system, which can then be subsequently used to check alignment and reposition the subject as necessary.
- Acquire a dynamic, 3D scan consisting of four-5 minute frames. Acquisition must start 50 minutes post injection.
The images must be immediately assessed for technical validity. If considered inadequate, the subject should have an additional 20 minutes of continuous imaging, collected as four 5-minute frames. If there is a repeat scan, a second transmission scan can be done after the emission acquisition. PET/CT scans will precede this acquisition with a CT scan for attenuation correction.

It is crucial that the subject’s position is checked several times throughout the 20 min PET scan. A good idea is to check the subject’s marks using the laser system at the end of each 5 min scan frame. The subject’s position should be returned as closely as possible to the original position just at the beginning of the next scan frame.

All images will need to be corrected using measured attenuation.
- PET Only Scanners
  - Acquire an attenuation correction scan using rod sources for 5-6 minutes after the acquisition of the standard emission scan. The subject should be repositioned “on their marks” prior to acquiring the transmission scan.
  - Segmentation and re-projection routines will be applied for attenuation correction.
- PET/CT Scanners
  - Standard CT acquisition parameters
  - The subject must undergo the CT scan starting at around 5 minutes prior to starting the PET scan. Be sure to prepare the subject so that you are ready to press “start” for the PET scan at the required time.

Upon completion the subject can be removed from the scanner and encouraged to void. The subject should also be instructed to drink plenty of fluids and void frequently throughout the day to help reduce radiation exposure.

Post Florbetapir Scan:

Reconstruct images using parameters specific to the system used for scanning. (See Appendix B in this document). The same reconstruction parameters should be used for all emission scans.

Upon completion of the reconstruction, review all the images to assess for artifacts and motion.

Archive ALL raw and processed study data including copies of the normalization and blank scans. It is necessary to archive and store raw and processed data at the imaging site for the duration of the project (approximately 5 years).

Transfer image data to the Laboratory of Neuroimaging (LONI) at USC. Please upload only the fully corrected image set.
IMPORTANT: Data uploads to LONI should be performed as soon as the images have been acquired & reconstructed as it will be important to promptly QC the data to identify if the scan needs to be repeated. The timeframe should be 1-2 business days from acquisition.
Appendix A – LONI Access User Registration

USER REGISTRATION

1. If you do not have a user account, **click REGISTER** on the Image & Data Archive Log-In page at [https://ida.loni.usc.edu](https://ida.loni.usc.edu)

2. Complete the form below to create a new account. To submit, click the **REGISTER** button.
3. Once the registration process is complete, a confirmation email will be sent with a temporary password and login instructions. **However, you will be unable to upload data until completion of step 4.**

4. Email [dba@loni.usc.edu](mailto:dba@loni.usc.edu) to request upload access. Be sure to include your site number in the email request.
Appendix B – Scanner Specific Reconstruction Parameters

Please note the following section outlines the reconstruction parameters for the florbetapir scan. As of May 9, 2014, no further FDG PET scans will be conducted under the ADNI 2 protocol.

Enrollment for the ADNI2 early frames add-on study has been met and this sub study is closed. Please do not conduct any further early frame add-on sequences, even if participants have been consented.
GE Discovery 600 and 690 - 47 slice PET/CT scanners

**Acquisition Parameters:**

Radiotracer:
- **florbetapir:** 9.0-11.0 mCi

Scan start time post-injection:
- **florbetapir:** 50 min

CT scan:
- **florbetapir:** Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Scans and scan duration:
- **florbetapir:** 20 min, four x 5-min frames

Randoms Correction:
- **Singles** (not real-time subtraction)

**Reconstruction Parameters:** florbetapir:

Primary Reconstruction Method: Iterative (fully 3D Iter; not 3D FORE IR):
- 4 iterations; 32 subsets (Discovery 600)
- 4 iterations; 24 subsets (Discovery 690)

Grid: 128 x 128

FOV: 256 mm (results in voxel size of 2.0 mm)

Slice Thickness: 3.27 mm

Smoothing Filter: NONE or 0.0 (for all filter options: loop filter, post-filter and z-axis filter)

All corrections ‘On’

***Secondary Reconstruction Method: If possible, we would like all subjects’ images for the standard sequence also to be reconstructed using 3D filtered back-projection [also called 3DRP (3D reprojection) or 3D Kinihan & Rogers]. Use a RAMP filter. Headers should say “Rad:rectangle\4.80000 mm\Ax:rectangle\6.50000 mm” for the filter cutoffs (which relate to the Nyquist frequency).

Questions: e-mail Robert Koepppe (koepppe@umich.edu)
GE Discovery STE - 47 slice PET/CT scanners

**Acquisition Parameters:**

Radiotracer: florbetapir: 9.0-11.0 mCi

Scan start time post-injection: florbetapir: 50 min

CT scan: florbetapir F 18: Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Scans and scan duration: florbetapir: 20 min, four × 5-min frames

Randoms Correction: Singles (not real-time subtraction)

**Reconstruction Parameters:** florbetapir:

Primary Reconstruction Method: Iterative (fully 3D Iter; not 3D FORE IR): 4 iterations; 20 subsets

Grid: 128 × 128

FOV: 256 mm (results in voxel size of 2.0 mm)

Slice Thickness: 3.27 mm

Smoothing Filter: NONE or 0.0 (for all filter options: loop filter, post-filter and z-axis filter)

All corrections ‘On’

***Secondary Reconstruction Method: If possible, we would like all subjects’ images for the standard sequence also to be reconstructed using 3D filtered back-projection [also called 3DRP (3D reprojection) or 3D Kinihan & Rogers]. Use a RAMP filter. Headers should say “Rad:\rectangle|4.80000 mm\Ax:\rectangle|6.50000 mm” for the filter cutoffs (which relate to the Nyquist frequency).

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
GE Discovery ST - 47 slice PET/CT scanners

**Acquisition Parameters:**

Radiotracer:
- **florbetapir**: 9.0-11.0 mCi

Scan start time post-injection:
- **florbetapir**: 50 min

CT scan:
- **florbetapir** F 18: Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Scans and scan duration:
- **florbetapir**: 20 min, four × 5-min frames

Randoms Correction:
- **Singles** (not real-time subtraction)

**Reconstruction Parameters**:

Primary Reconstruction Method: **Iterative if available** (fully 3D Iter; not 3D FORE IR) Only if fully iterative is not available, as in some older systems, is it ok to use 3D FORE IR.
- 4 iterations; 21 subsets* (* for older software versions having only 3D FORE IR, 24 subsets is acceptable)

Grid: 128 × 128

FOV: 256 mm (results in voxel size of 2.0 mm)

Slice Thickness: 3.27 mm

Smoothing Filter: **NONE or 0.0** (for all filter options: loop filter, post-filter and z-axis filter)

All corrections ‘On’

***Secondary Reconstruction Method**: If possible, we would like all subjects’ images for the standard sequence also to be reconstructed using 3D filtered back-projection [also called 3DRP (3D reprojection) or 3D Kinihan & Rogers]. Use a **RAMP** filter. Headers should say “Rad\rectangle\6.30000 mm\Ax:\rectangle\6.50000 mm” for the filter cutoffs (which relate to the Nyquist frequency) (note: some software versions say 6.4 instead of 6.3 mm).

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
**GE Discovery RX - 47 slice (LYSO) PET/CT scanners**

**Acquisition Parameters:**

Radiotracer:  
florbetapir: 9.0-11.0 mCi

Scan start time post-injection:  
florbetapir: 50 min

CT scan:  
florbetapir F 18: Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Scans and scan duration:  
florbetapir: 20 min, four × 5-min frames

Randoms Correction:  
Singles (not real-time subtraction)

**Reconstruction Parameters:** florbetapir:

Primary Reconstruction Method:  
Iterative (3D Iter; not 3D FORE IR):  
4 iterations; 21 subsets

Grid:  
128 × 128

FOV:  
256 mm (results in voxel size of 2.0 mm)

Slice Thickness:  
3.27 mm

Smoothing Filter:  
NONE or 0.0 (for all filter options: loop filter, post-filter and z-axis filter)

All corrections ‘On’

***Secondary Reconstruction Method: If possible, we would like all subjects’ images for the standard sequence also to be reconstructed using 3D filtered back-projection [also called 3DRP (3D reprojection) or 3D Kinihan & Rogers]. Use a RAMP filter. Headers should say “Rad:rectangle\4.30000 mm\Ax:rectangle\6.50000 mm” for the filter cutoffs (which relate to the Nyquist frequency).

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
GE Discovery LS - 35 slice (PET/CT) scanners

**Acquisition Parameters:**

Radiotracer:  
florbetapir: 9.0-11.0 mCi

Scan start time post-injection:  
florbetapir: 50 min

CT scan:  
florbetapir F 18: Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Scans and scan duration:  
florbetapir: 20 min, four × 5-min frames

Randoms Correction:  
Singles (not real-time subtraction, unless singles correction not available)

**Reconstruction Parameters:** florbetapir:

Primary Reconstruction Method:  
FORE Iterative: 4 iterations; 21 subsets

Grid: 128 x 128

FOV: 256 mm (results in voxel size of 2.0 mm)

Slice Thickness: 4.25 mm

Smoothing Filter: NONE or 0.0 (for all filter options: loop filter, post-filter and z-axis filter)

All corrections ‘On’

***Secondary Reconstruction Method: If possible, we would like all subjects’ images for the standard sequence also to be reconstructed using 3D filtered back-projection [also called 3DRP (3D reprojection) or 3D Kinihan & Rogers]. Use a RAMP filter. Headers should say “Rad: rectangle\4.00000 mm\Ax: rectangle\8.50000 mm” for the filter cutoffs (which relate to the Nyquist frequency).

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
**GE Advance - 35 slice PET scanners**

**Acquisition Parameters:**

Radiotracer:
- **florbetapir**: 9.0-11.0 mCi

Scan start time post-injection:
- **florbetapir**: 50 min

Transmission scan:
- **florbetapir**: Five or six min 2-D scan acquired immediately post-emission scan; process with segmentation.

Scans and scan duration:
- **florbetapir**: 20 min, four × 5-min frames

Randoms Correction:
- **Singles** (not real-time subtraction, unless singles correction not available)

**Reconstruction Parameters**: florbetapir:

Primary Reconstruction Method: **FORE Iterative**:
- 4 iterations; 21 subsets

Grid: 128 × 128

FOV: 256 mm (results in voxel size of 2.0 mm)

Slice Thickness: **4.25 mm**

Smoothing Filter: **NONE or 0.0** (for all filter options: loop filter, post-filter and z-axis filter)

All corrections ‘On’

***Secondary Reconstruction Method**: If possible, we would like all subjects’ images for the standard sequence also to be reconstructed using **3D filtered back-projection** [also called **3DRP** (3D reprojection) or **3D Kinihan & Rogers**]. Use a **RAMP** filter. Headers should say “Rad: rectangle|4.00000 mm| Ax: rectangle|8.50000 mm” for the filter cutoffs (which relate to the Nyquist frequency).

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Acquisition Parameters:

Radiotracer: florbetapir: 9.0-11.0 mCi

Scan start time post-injection: florbetapir: 50 min

CT scan: florbetapir F 18: Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Acquisition Protocol: Brain Protocol

Scans and scan duration: florbetapir: 20 min, four × 5-min frames

Reconstruction Parameters: florbetapir:

Reconstruction Method: Iterative: LOR 3D Ramla (*** Note: if only older software versions are available, 3D Ramla reconstruction is acceptable)

Grid: 128 × 128

FOV: 256 mm (results in voxel size of 2.0 mm)

Slice Thickness: 2.0 mm

Smoothing: Set SMOOTH parameter to ‘SHARP’ (**Note: for older software with 3D-RAMA reconstruction, the smoothing is governed by the parameter lambda, which should be set to a value of 0.008)

All other parameters should be set to defaults for the “Brain” protocol

All corrections ‘On’

For LOR 3D Ramla reconstruction: The attenuation field should indicate “CTAC-SG” and the scatter field should indication “SS-Simul”

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Philips Gemini and Gemini GXL - 90 slice PET/CT scanners

**Acquisition Parameters:**

Radiotracer:
- **florbetapir**: 9.0-11.0 mCi

Scan start time post-injection:
- **florbetapir**: 50 min

CT scan:
- **florbetapir**: Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Acquisition Protocol: **Brain Protocol**

Scans and scan duration:
- **florbetapir**: 20 min, four x 5-min frames

**Reconstruction Parameters**: florbetapir:

Reconstruction Method: **Iterative: LOR 3D Ramla** (*** Note: if only older software versions are available, 3D Ramla reconstruction is acceptable)

Grid: 128 x 128

FOV: 256 mm (results in voxel size of 2.0 mm)

Slice Thickness: 2.0 mm

Smoothing: Set SMOOTH parameter to ‘SHARP’ (**Note: for older software with 3D-RAMA reconstruction, the smoothing is governed by the parameter lambda, which should be set to a value of 0.008)

All other parameters should be set to defaults for the “Brain” protocol

All corrections ‘On’

For LOR 3D Ramla reconstruction: The attenuation field should indicate “CT-SEG” and the scatter field should indication “SS-Simul”

For 3D Ramla reconstruction: Attenuation and scatter fields should indicate “NonUni-BGSub”

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Philips Allegro - 90 slice PET scanners

**Acquisition Parameters:**

Radiotracer: florbetapir: 9.0-11.0 mCi

Scan start time post-injection: florbetapir: 50 min

Transmission scan: florbetapir: **Five or six min 2-D scan** acquired immediately post-emission scan; process with segmentation.

Acquisition Protocol: **Brain Protocol**

Scans and scan duration: florbetapir: **20 min, four × 5-min frames**

**Reconstruction Parameters:** florbetapir:

Reconstruction Method: **Iterative: LOR 3D Ramla** (**Note: if only older software versions are available, 3D Ramla reconstruction is acceptable**)

Grid: 128 × 128

FOV: 256 mm (results in voxel size of 2.0 mm)

Slice Thickness: 2.0 mm

Smoothing: Set SMOOTH parameter to ‘SHARP’ (**Note: for older software with 3D-RAMA reconstruction, the smoothing is governed by the parameter lambda, which should be set to a value of 0.008**)

All other parameters should be set to defaults for the “Brain” protocol

All corrections ‘On’

For LOR 3D Ramla reconstruction: The attenuation field should indicate “CT-SEG” and the scatter field should indication “SS-Simul”

For 3D Ramla reconstruction: Attenuation and scatter fields should indicate “NonUni-BGSub”

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Siemens ECAT Exact HR+ (BGO) 63-slice scanners

**Acquisition Parameters:**

Radiotracer: florbetapir: 9.0-11.0 mCi

Scan start time post-injection: florbetapir: 50 min

Acquisition mode: 3-D

Scan duration and framing: florbetapir: 20 min, four × 5-min frames

Transmission scan: florbetapir: Five or six min 2-D scan acquired immediately post-emission scan; process with segmentation.

**Reconstruction Parameters**, florbetapir:

Method: Iterative: (FORE / OSEM-2D) 4 iterations; 16 subsets

Grid: 128 × 128

Brain Mode: ON

Zoom: 2.0

Smoothing
  Filter: NONE (software version 7.2 says ‘All Pass (Ramp)’)
  Axial filtering: NONE (software version 7.2 says ‘Off’)

All corrections ‘On’

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Siemens HRRT 207-slice scanners

**Acquisition Parameters:**

Radiotracer: florbetapir: 9.0-11.0 mCi

Scan start time post-injection: florbetapir: 50 min

Acquisition mode: 3-D

Scan duration and framing: florbetapir: 20 min, four × 5-min frames

Transmission scan: florbetapir: Five or six min scan acquired immediately post-emission scan.

**Reconstruction Parameters**, florbetapir:

Method: Iterative: (OSEM-3D) 6 iterations; 16 subsets

Grid: 256 × 256 × 207

Voxel size: 1.219 mm³

Smoothing Filter: florbetapir: 2mm Gaussian

All corrections ‘On’

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Siemens BioGraph mCT - 81 or 109 (TrueV) slice PET/CT scanners

**Acquisition Parameters:**

Radiotracer:
- **florbetapir:** 9.0-11.0 mCi

Scan start time post-injection:
- **florbetapir:** 50 min

CT scan:
- **florbetapir** Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Scans and scan duration:
- **LIST-MODE:** If your scanner has list-mode capability:
  - **florbetapir:** 20 min, four × 5-min frames
- **NO LIST-MODE:** If your scanner does not have list-mode capability:
  - **florbetapir** Two scans: 10-min each
  
  *** Note that reduce motion artifacts, two separate emission scans will be acquired as closely together as possible. The first is to be started at 50 min. Do not repeat CT scan.

**Reconstruction Parameters**, **florbetapir**:

Method:
- **Iterative:** OSEM-3D
  - 4 iterations; 24 subsets

Grid:  
- **400 × 400**

Zoom:  
- **2.0** (results in voxel size of ~1.018 mm)

Smoothing Filter: **NONE** (All-pass or ‘0.0’)

Match CT: ‘Off’ or ‘No’ (results in PET slice thickness of ~2.027 mm)

All corrections ‘On’

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Siemens BioGraph TruePoint - 81 or 109 (TrueV) slice PET/CT scanners (Model 1093)

Acquisition Parameters:

Radiotracer: florbetapir: 9.0-11.0 mCi

Scan start time post-injection:

florbetapir: 50 min

CT scan:
florbetapir: Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Scans and scan duration:

**LIST-MODE**: If your scanner has list-mode capability:
florbetapir: 20 min, four × 5-min frames

**NO LIST-MODE**: If your scanner does not have list-mode capability:
florbetapir: Two scans: 10-min each
***Note that reduce motion artifacts, two separate emission scans will be acquired as closely together as possible. The first is to be started at 50 min. Do not repeat CT scan.

Reconstruction Parameters, florbetapir:

Method: Iterative: FORE / OSEM-2D
4 iterations; 14 subsets (or 16 subsets if 14 is not an option with your software)

Grid: 336 × 336
Note: if the software version you are running still allows “TRIM” to be set, then reconstruction can be down into a 168 × 168 matrix with TRIM ‘ON’

Zoom: 2.0 (results in voxel size of ~1.015 mm; or ~2.03 mm for the 168 × 168 grid)

Smoothing Filter: NONE (All-pass or ‘0.0’)

Match CT: ‘Off’ or ‘No’ (results in PET slice thickness of ~2.027 mm)

All corrections ‘On’

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Siemens BioGraph HiRes - 81 slice PET/CT scanners (Model 1080)

**Acquisition Parameters:**

Radiotracer:

- **florbetapir:** 9.0-11.0 mCi

Scan start time post-injection:

- **florbetapir:** 50 min

CT scan:

- **florbetapir:** Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Scans and scan duration:

- **LIST-MODE:** If your scanner has list-mode capability:
  - **florbetapir:** 20 min, four × 5-min frames

- **NO LIST-MODE:** If your scanner does not have list-mode capability:
  - **florbetapir:** Two scans: 10-min each

  *** Note that reduce motion artifacts, two separate emission scans will be acquired as closely together as possible. The first is to be started at 50 min. Do not repeat CT scan.

**Reconstruction Parameters**, **florbetapir**:

Method: 

- **Iterative:** FORE / OSEM-2D
  - 4 iterations; 14 subsets (or 16 subsets if 14 is not an option with your software)

Grid: 

- 168 × 168

TRIM: 

- ‘On’

Zoom: 

- 2.0 (results in voxel size of ~2.031 mm)

Smoothing Filter: 

- **NONE** (All-pass or ‘0.0’)

Match CT Slice location: ‘**Off**’ or ‘No’ (results in PET slice thickness of ~2.000 mm)

All corrections ‘On’

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Siemens BioGraph (LSO) 47-slice PET/CT scanners
(also sold as CTI Reveal)

**Acquisition Parameters:**

Radiotracer:

florbetapir: 9.0-11.0 mCi

Scan start time post-injection:

florbetapir: 50 min

CT scan:
florbetapir: Low mAs scan acquired shortly before emission. Leave enough time to start emission acquisition promptly at 50 min.

Scans and scan duration:

florbetapir: Two scans: 10-min each

*** Note that reduce motion artifacts, two separate emission scans will be acquired as closely together as possible. The first is to be started at 50 min. If your scanner software version does not allow a repeat emission acquisition unless you perform a second CT scan, please contact Robert Koeppe (see below) prior to scanning

**Reconstruction Parameters.** florbetapir:

Method: Iterative: (FORE / OSEM-2D)

6 iterations; 16 subsets (or 14 subsets if 16 is not an option)

Grid: 128 x 128

TRIM: ON

Zoom: 2.0

Smoothing Filter: NONE (or ‘0.0’)

All corrections ‘On’

If your scanner software version has an option for “Match CT Slice location”, this must be left ‘OFF’ (e.g. box is unchecked)

Questions: e-mail Robert Koeppe (koeppe@umich.edu)
Siemens ECAT Exact (BGO) and Accel (LSO) 47-slice scanners

**Acquisition Parameters:**

Radiotracer:  
**florbetapir:** 9.0-11.0 mCi

Scan start time post-injection:  
**florbetapir:** 50 min

Acquisition mode:  
3-D

Scan duration and framing:  
**florbetapir:** 20 min, four × 5-min frames

Transmission scan:  
**florbetapir:** Five or six min 2-D scan acquired immediately post-emission scan; process with segmentation.

**Reconstruction Parameters**, florbetapir:

Method:  
Iterative: (FORE / OSEM-2D)  
6 iterations; 16 subsets

Grid:  
128 × 128

Brain Mode:  
ON

Zoom:  
2.0

Smoothing  
Filter:  
NONE (software version 7.2 says ‘All Pass (Ramp)’)  
Axial filtering:  
NONE (software version 7.2 says ‘Off’)

All corrections ‘On’

Questions: e-mail Robert Koeppe (koeppe@umich.edu)