Austin Radiological Association

BRAIN AMYLOID STUDY
Neuraceq
(F-18-Florbetaben)

Overview

- The Brain Amyloid Study with F-18-florbetaben depicts the extracellular deposition of B-amyloid (Aβ) peptides (or "plaques") in the brain in a tomographic fashion. This deposition is one of the pathological hallmarks of Alzheimer's disease (AD).

Indications

- Persistent or progressive unexplained mild cognitive impairment (MCI),
- The core clinical criteria for possible AD are satisfied, but there is an unclear clinical presentation – either an atypical clinical course or an etiologically mixed presentation, or
- Patients with progressive dementia and atypically early age of onset (usually defined as 65 years or less in age).

Medicare Amyloid PET Reimbursement Guidelines:

Indication	CPT	Coverage Guidelines
Pending MAC coverage determination	**78814**	**TBD**

NOTE:
Private payer coverage for PET often reflects that of Medicare but may vary. Providers should obtain coverage and pre-authorization guidelines for PET from their private payers.

Examination Time

- Allow approximately 1.5 hours for the entire Amyloid PET/CT brain study.

- Prior to Scan: Allow 30 minutes for interview, IV, injection, followed by 45 – 130 minute uptake post injection. Goal is 60 minutes post injection.

- Image acquisition:
  1. 78814 (PET Limited)
     a. 20 minutes acquisition

Patient Preparation

- Prior to arriving for the study:
  1. None
  2. Explain exam to ensure patient can cooperate in remaining still

- Recent interventions, i.e. surgery, radiation therapy, biopsy, and chemotherapy:
  1. Record any interventions during the last 3 months.

- Place the patient in a dimly lit, quiet room for 45 minutes

- Have patient void prior to imaging.

- Sedation may be needed for claustrophobia. Alprazolam (Xanax) at 1 mg is commonly used to treat panic disorders including claustrophobia. Sedation for brain studies must be given approximately 30 minutes post injection to prevent interference with distribution.

Equipment & Energy Windows

- Imaging system:
  - Siemens Biograph Horizon Tru-v PET/CT scanner.

- Collimators:
  - 3D mode (septa out or absent) *(Siemens Biograph Horizon only has 3D function)*

- Energy windows (may vary with manufacturer and machine design): 30% window centered at 511 keV.

Radiopharmaceutical, Dose, & Technique of Administration

- Radiopharmaceutical: F-18-florbetaben
- Dosing:

  Average Adult 8.1 mCi (300 MBq)

  Pediatric Patients – not applicable

  ARA RAM licensure allows +/- 20% dose variance.

- Technique of administration: Slow injection via standard intravenous injection or through an existing intravenous line. 6 sec/mL. Follow with 10 mL saline flush.

Patient Positioning & Imaging Field

- Patient position: Supine.
- Restrain the head: Position the patient's head in the standard head holder.
- Imaging field of view: Entire brain in the field of view, including cerebellum. Avoid extreme neck flexion or extension if possible. Use positioning aids and head restraints as necessary.

Acquisition Protocol

- Have the patient empty his/her bladder before image acquisition.
- Begin image acquisition approximately 50 minutes following injection of F-18-florbetapir
- Imaging times:

  Siemens Biograph Horizon

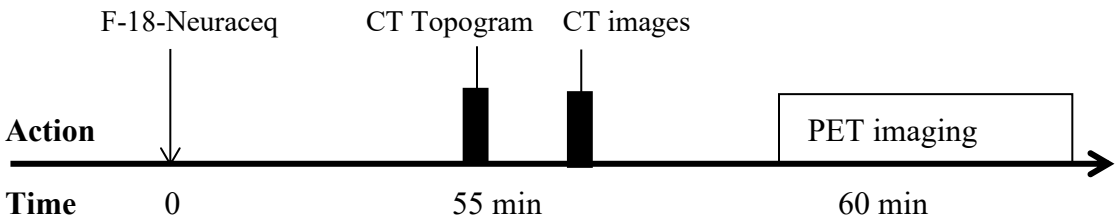
  - Emission data acquisition: 20 minutes.
- Have the patient empty his/her bladder after image acquisition.

CT parameter values vary with patient size and machine specific factors:

1. Milliampere-seconds (mAs) and Kilovolts peak (kVp) guidelines:
   a) average adult: 55 eff mAs, 120 kVp.

2. Siemens Care Dose is not utilized on Brain studies due to the bone density in the head.

Protocol Summary Diagram



Data Processing

- The PET images are reconstructed using iterative reconstruction with TOF when available. Siemens settings include: matrix 360, 8 iterations, 10 subsets, Gaussian filter, filter FWHM 4.0, zoom 2.0.

- A rotating maximum intensity projection (MIP) display and surface-rendered 3D displays facilitate lesion evaluation.

Principle Radiation Emission Data - F-18

- Physical half-life = 109.8 minutes.

Radiation	Mean % per disintegration	Mean energy (keV)
Positron	100	250
Gamma ±	200	511

Dosimetry - Computed Tomography

- Actual effective doses will depend on the user-specific exam protocols and the specific CT scanner used. It is important that each facility develop appropriate exam protocols and monitor the resultant patient doses for each machine in use.

Effective dose	rem	mSv
Diagnostic CT	0.15	1.5
Low dose CT	0.01	0

2.5 Radiation Dosimetry

The estimated radiation absorbed doses for adults from intravenous injection of Neuraceq are shown in Table 1.

Table 1 Estimated Radiation Absorbed Doses from Intravenous Injection of Neuraceq

Organ/Tissue	Mean Absorbed Radiation Dose per Unit Administered Activity [mcGy/MBq]
Adrenals	13
Brain	13
Breasts	7
Gallbladder Wall	137
Heart Wall	14
Kidneys	24
Liver	39
Lower Large Intestine-Wall	35
Lungs	15
Muscle	10
Osteogenic Cells	15
Ovaries	16
Pancreas	14
Red Marrow	12
Skin	7
Small Intestine	31
Spleen	10
Stomach Wall	12
Testes	9
Thymus	9
Thyroid	8
Upper Large Intestine-Wall	38
Urinary Bladder Wall	70
Uterus	16
Total Body	11
Effective Dose (mcSv/MBq)	19

The effective dose resulting from a 300 MBq (8.1 mCi) administration of Neuraceq in adult subjects is 5.8 mSv. The use of a CT scan to calculate attenuation correction for reconstruction of Neuraceq images (as done in PET/CT imaging) will add radiation exposure. Diagnostic head CT scans using helical scanners administer an average of 2.2 mSv ± 1.3 mSv effective dose (CRCPD Publication E-07-2, 2007). The actual radiation dose is operator and scanner dependent. Thus, the total combined radiation exposure from Neuraceq administration and subsequent scan on a PET/CT scanner is estimated to be 8 mSv.

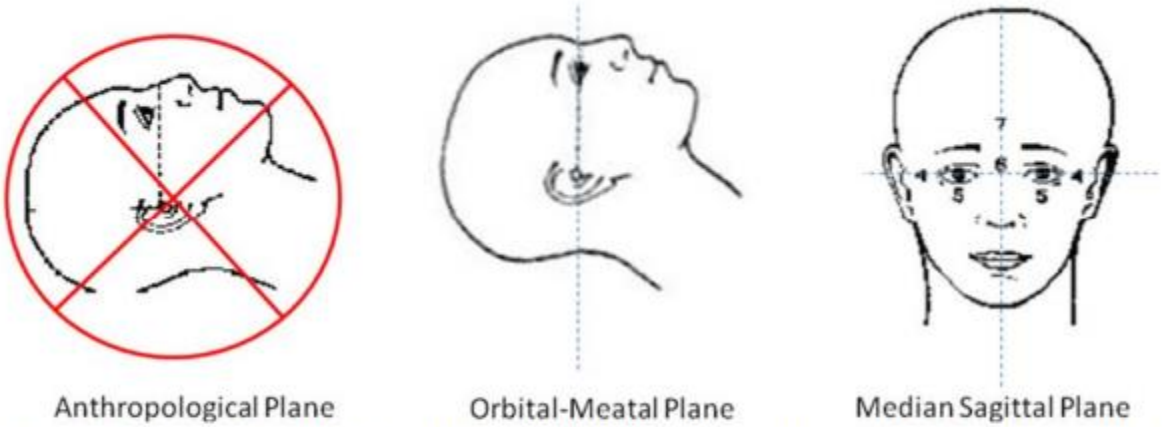


Figure 1: Schematic of Orbital-Meatal Plane. Patient should be positioned with scanner laser aligned to the orbital-meatal and median sagittal planes. Note that there is about a 10-15 degree difference between the anthropological and orbital-meatal planes. Aligning to the anthropological plane could result in the cerebellum or brain stem being cut off. Also note that some patients (e.g., kyphotic subjects) may not be able to be comfortably positioned in this ideal orientation. In this case, it is acceptable to slightly deviate from this position. It is more important that the subject be able to comfortably maintain their head position for the entire PET scan duration.