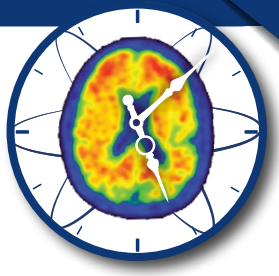
SOCIETY OF
NUCLEAR MEDICINE
AND MOLECULAR IMAGING

TECHNOLOGIST SECTION



Correlative Imaging in Dementia

PURPOSE OF IMAGING PATIENTS WITH SUSPECTED DEMENTIA IS TO EVALUATE 2 GROUPS OF BIOMARKERS:

- Evaluate an underlying molecular pathologic condition (PET).
- Evaluate for evidence of neurodegeneration (MRI).

STRUCTURAL MRI IMAGING:

- Helps exclude non-neurodegenerative etiologies such as vascular diseases.
- Can show evidence of focal atrophy to suggest specific neurodegenerative diseases.
- Quantitative post processing techniques may assist in early diagnosis of neurodegenerative dementia.
- LIMITATIONS:
  - Contraindicated in patients with pacemakers and other implanted devices.
  - Degradation of images due to any patient motion.
  - Structural damage may need to occur before it will appear on images, despite cellular damage.

PET F-18FDG:

- Can locate abnormalities before anatomical images may show changes in the brain.
- LIMITATIONS:
  - Limited to evaluation of cerebral metabolism.
  - Distribution depends on regional metabolism and blood flow and changes according to synaptic activity and cell density responses; allowing for discrimination of the underlying etiology.
  - Sensitivity to synaptic activity affected by medications and psychiatric illnesses can change or obscure patters from underlying neurodegeneration.

AMYLOID PET:

- Evaluate for the presence of fibrillary β-amyloid deposits, a hallmark of pathologic substrates of Alzheimer's disease.
- Three agents available for detection of cerebral amyloid.
- Shows detectable cortical uptake with high sensitivity and specificity when a moderate to severe burden of plaque is present.
- LIMITATIONS:
  - Cortical amyloid is not specific for the presence of cognitive symptoms, affecting positive predictive values.

IMAGING ADVANCEMENTS:

- Voxel-based morphometry: allows for global and regional quantification of brain volume or cortical thickness for MR imaging and of radiotracer distribution and kinetics of PET to better quantify data.
- New tracer development to target other pathologic proteins for neurodegenerative diseases including tau and α-synuclein.

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