



# Comparative Imaging Fact Sheet

## INDICATIONS:

- Two groups of biomarkers for patient with suspected dementia:
  - To evaluate an underlying molecular pathologic condition (PET).
  - To 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:
  - Contraindications in patients with pacemakers and other implanted devices.
  - Degradation of images due to any patient motion.
  - Cellular damage will precede structural damage and may not be visualized with early imaging.

## PET F-18 FDG:

- Can display metabolic changes before anatomical structural damage is visualized.
- LIMITATIONS:
  - Limited to evaluation of cerebral metabolism.
  - Distribution depends on regional metabolism, blood flow, changes according to synaptic activity, and cell density.
  - Synaptic activity affected by medications and psychiatric illnesses can change or obscure patterns from underlying neurodegeneration.

## AMYLOID PET:

- Evaluate for the presence of fibrillary  $\beta$ -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:
  - Prominent nonspecific white matter uptake is seen in clinically available radiotracers making visual evaluation more difficult. 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  $\alpha$ -synuclein.