

**RSNA Statement on Imaging in the Evaluation of Dementia**  
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*The Radiological Society of North America (RSNA) is committed to excellence in patient care through education and research.*

- Dementia encompasses a group of disorders that result in cognitive deficits in domains such as memory, language, visuospatial perception, attention, and behavior. Most are caused by progressive neurodegenerative disease and result in significant disability. Dementia is operationally defined by deficits in multiple cognitive domains of sufficient severity to interfere with functional activities of daily living. Because of their insidious onset, the similarity of different dementia syndromes at early stages and the difficulty in distinguishing early dementia from the changes of normal aging on imaging and clinical evaluation, the diagnosis of dementia is often challenging.
- The most common neurodegenerative disorders are Alzheimer's disease, Lewy body dementia, and frontotemporal lobar degeneration. Cerebrovascular disease, although not a common lone cause of dementia, is the second most common comorbid pathology underlying dementia after Alzheimer's disease. The prevalence of Alzheimer's disease, the most common neurodegenerative disorder, is rapidly increasing worldwide as the population ages. Most elderly individuals with diagnosis of dementia are found to have a mixed dementia patterns with multiple contributing pathologies at autopsy, most commonly combinations of Alzheimer's disease with cerebrovascular disease and/or Lewy body disease.
- An accurate diagnosis can be used to tailor appropriate care, including supportive care, and to help in life planning for patients, families, and caregivers. It is also useful to assess blood relatives of the affected patient, as heredity may play a role in the development of some neurodegenerative diseases, such as Alzheimer's disease.
- Because structural brain imaging with MRI can identify some uncommon but potentially treatable conditions that may also cause cognitive decline, most practice guidelines include imaging in the workup of patients undergoing evaluation for cognitive complaints. Quantitative, volumetric analysis of high-resolution structural MRI may have utility for diagnosis and staging the severity of Alzheimer's disease and other neurodegenerative diseases.
- CT may be considered as an alternative if MRI is contraindicated but does not have the same diagnostic utility for the evaluation of dementia, especially rapidly progressive dementia.
- Brain FDG-PET and amyloid PET imaging may be helpful for selected patients with dementia. Imaging including amyloid PET and MRI also plays an important role when patients are being considered for treatment and therapy planning with new or investigational drugs. As recommended by the Society of Nuclear Medicine and Molecular Imaging and the Alzheimer's Association, brain FDG-PET should not be used as a screening examination.
- In addition, Alzheimer's disease is defined neuropathologically by the deposition of extracellular plaques composed of aggregated forms of the Amyloid- $\beta$  ( $A\beta$ ) polypeptide, and intra-neuronal neurofibrillary tangles composed of aggregated hyper-phosphorylated tau protein. Recently, molecular imaging tracers have been developed that bind to  $A\beta$  plaques in the brain and have enabled in vivo evaluation of  $A\beta$  plaque deposition using PET/CT or PET/MR. Currently, three molecular imaging compounds have been approved for imaging amyloid and one for imaging tau. These include  $^{18}\text{F}$ -florbetapir (Amyvid<sup>TM</sup>),  $^{18}\text{F}$ -flutemetamol (Vizamyl<sup>TM</sup>),  $^{18}\text{F}$ -florbetaben (NeuraCeq<sup>TM</sup>) and  $^{18}\text{F}$ -flortaucipir (Tauvid<sup>TM</sup>). These imaging biomarkers play a role in defining and diagnosing the various stages of Alzheimer's disease.

- There are currently two (Leqembi (lecanemab-irmb) and Kisunla (donanemab-azbt) approved drugs for treating Alzheimer's disease that aim to slow cognitive decline. These drugs target amyloid plaques and are intended for patients in the early stages of the disease. Typically, amyloid imaging is used to confirm eligibility and to monitor response to these therapies.
- To improve patient health and safety, appropriate precautions should always be taken to minimize radiation exposure through the use of the “As Low As Reasonably Achievable (ALARA)” principle.

*RSNA is a strong advocate for quality, safety, equity and strict adherence to appropriateness criteria in medical imaging and radiation oncology. Through its peer-reviewed journals, education programs and annual scientific assembly, RSNA continually informs radiologists, medical physicists, radiation oncologists and other radiology professionals of the latest technologies and research developments designed to optimize dose and improve patient safety.*