

Dementia: Definition, Diagnosis, Prevention

Introduction

Dementia is a general term used to describe a decline in cognitive functions such as memory, language, thinking ability, and decision-making that interferes with a person's ability to live independently.¹ Dementia is not a specific disease but rather a group of symptoms caused by several brain disorders that gradually damage nerve cells.¹ These disorders lead to the loss of brain volume and disruption in communication pathways that help with memory and coordination. As dementia progresses in the brain, it can cause struggles with simple activities like paying bills, cooking supper, or even recognizing familiar faces. Eventually, many patients need twenty-four-hour care for their safety.¹

Types of Dementia

Alzheimer's disease is the most common type of dementia. It is associated with the buildup of amyloid plaques and tau tangles that interfere with communication between brain cells and eventually cause nerve cell death.¹

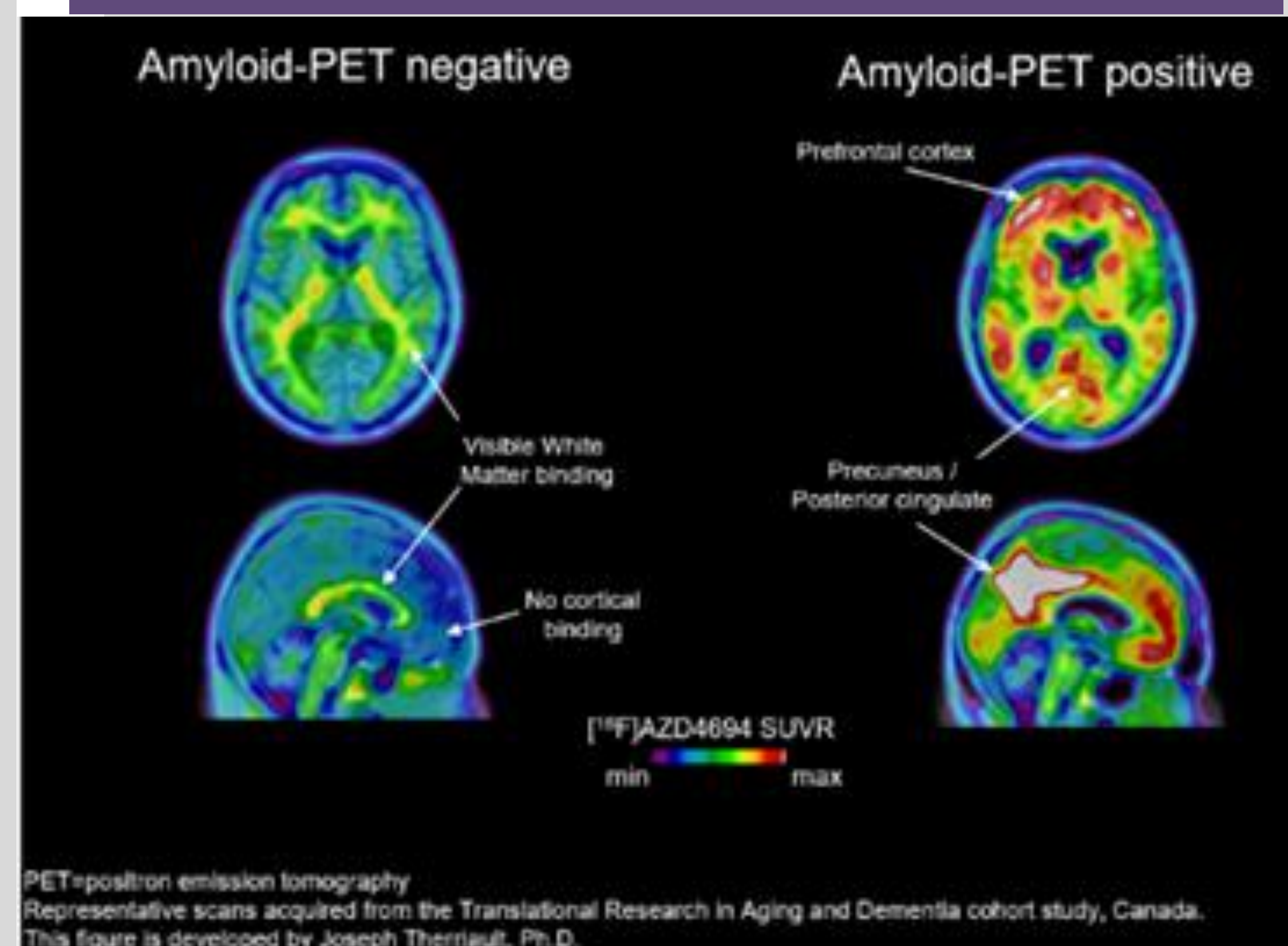
Vascular dementia is caused by impaired blood flow to the brain due to strokes, vessel narrowing, or chronic high blood pressure.⁴

Lewy body dementia involves an abnormal buildup of the protein alpha synuclein inside brain cells.¹ Patients experience cognitive decline along with hallucinations and movement symptoms similar to Parkinson's disease

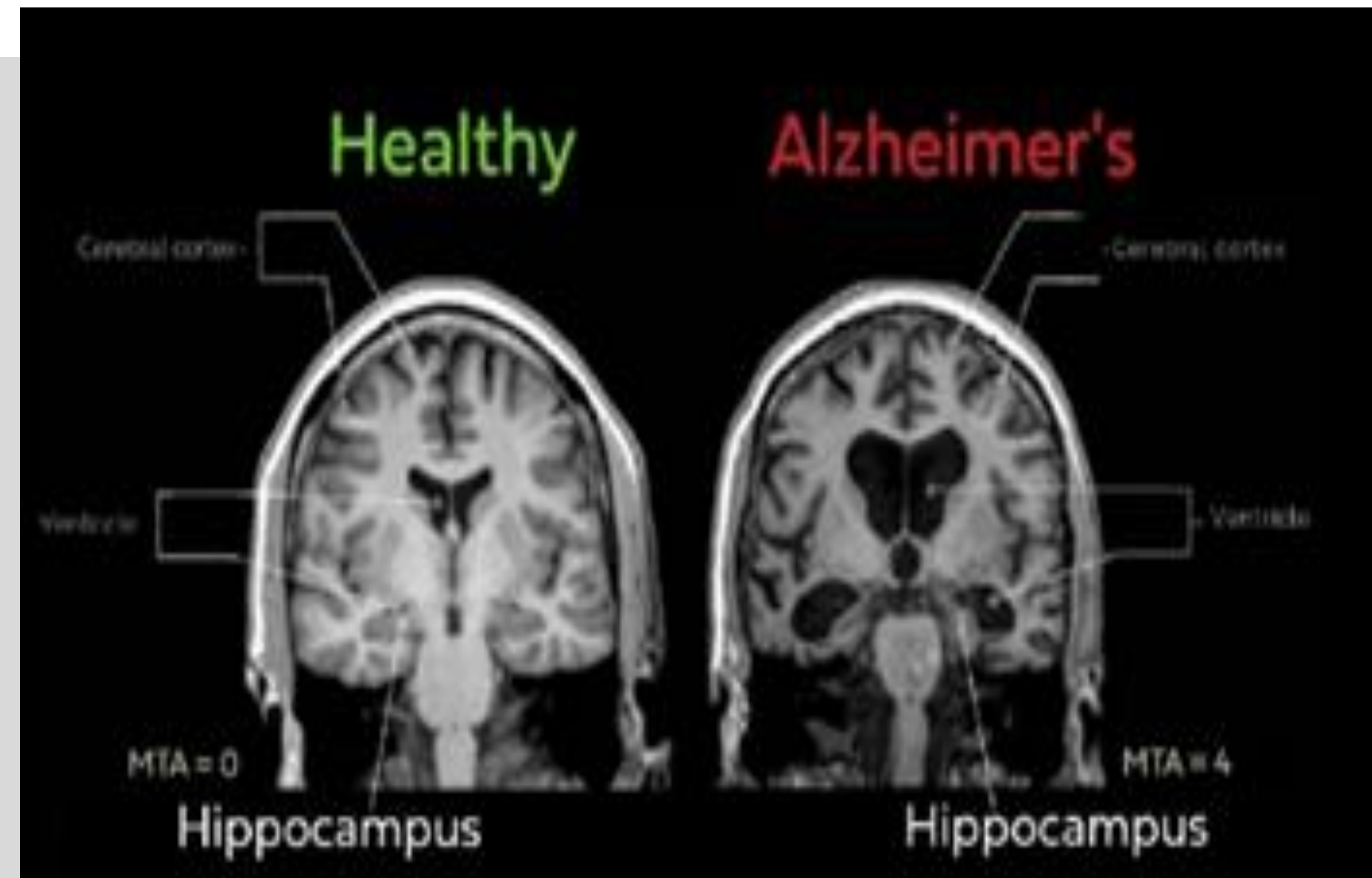
Frontotemporal dementia damages the frontal and temporal lobes that control personality, behavior, emotions, and language.

Diagnosis

Diagnosing dementia can be complicated and involves a combination of clinical exams, cognitive assessments, laboratory testing, and radiologic imaging.⁵ Blood testing is commonly performed to look for thyroid disorders, vitamin deficiencies, infections, or metabolic problems that can cause memory impairment.⁵ In some cases, a lumbar puncture may be ordered to analyze cerebrospinal fluid for biomarkers, such as beta amyloid and tau proteins. These proteins are associated with Alzheimer's disease.⁷ A cerebrospinal fluid test can help confirm diagnosis at an earlier stage combined with brain imaging. Imaging identifies whether brain changes are caused by a neurodegenerative disease or a reversible condition such as head trauma or bleeding. Imaging allows evaluation of both the structure and function of the brain and is important in diagnosis and treatment planning.



Amyloid PET image comparing amyloid-negative (left) and amyloid-positive (right) scan patterns in a patient suspected of Alzheimer's disease.



MRI demonstrating hippocampal atrophy and medial temporal lobe volume loss in a patient with Alzheimer's disease.

Imaging Tools Used In Dementia

Computed tomography is often the first imaging exam performed for patients presenting with sudden confusion or neurological symptoms.⁵ It is fast and effective for detecting hemorrhage, stroke, and mass lesions. Computed tomography angiography uses intravenous contrast to evaluate vascular abnormalities like stenosis or aneurysms that may contribute to vascular dementia.

Magnetic resonance imaging is the primary imaging method used in most dementia evaluations.⁶ It has excellent soft tissue detail and can detect early signs of Alzheimer's disease. Magnetic resonance imaging is also important for vascular dementia because it can show white matter hyperintensity as an indicator of chronic ischemic disease.

Positron emission tomography scans measure how active different parts of the brain are by tracking glucose metabolism.⁵ Alzheimer's disease typically shows reduced metabolic activity in the temporal and parietal lobes.⁶ Amyloid positron emission tomography scans use special radiotracers to identify the amyloid plaque deposits. This can provide an earlier diagnosis than magnetic resonance imaging alone.

Conclusion

Radiologic technologists are the eyes of health care. They acquire high quality diagnostic images, maintain patient safety, and provide compassion during procedures. Early and accurate imaging helps differentiate between different dementia types, determine the most appropriate treatment, and monitor for complications such as amyloid related imaging abnormalities.⁸

Although dementia currently has no cure, there are many ways to prevent or delay this disease. Lifestyle changes, prevention strategies, and early medical intervention offer the best chance for having independence and quality of life for as long as possible. Research and advancements in imaging technology continue to improve diagnostic accuracy and future treatment possibilities. With continued innovation and education, radiologic technologists will remain essential members of the healthcare team in the fight against dementia.

Sources

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