Alzheimer's vs Dementia:

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Objectives

- Differentiate Alzheimer’s Disease from other forms of Dementia
- Identify the shared characteristics of Alzheimer’s Disease and other forms of Dementia
- List the recommended Imaging Modalities for diagnosing Alzheimer’s Disease and Dementia
- Describe how MRI, PET, and CT are used to visualize the effect of Alzheimer's disease and Dementia on the brain

Difference between Alzheimer's and Dementia

Alzheimer's

Alzheimer's is a neurocognitive degenerative disease that is one of the most common forms of dementia. Alzheimer's accounts for around 60-80% of dementia cases (Alzheimer's Association, 2019).

The brain develops clumps of proteins called beta-amyloid plaques and tau protein tangles. These form on brain and nerve cells ultimately causing the cells to die affecting the memory and thinking sections of the brain (Jividen, 2023).

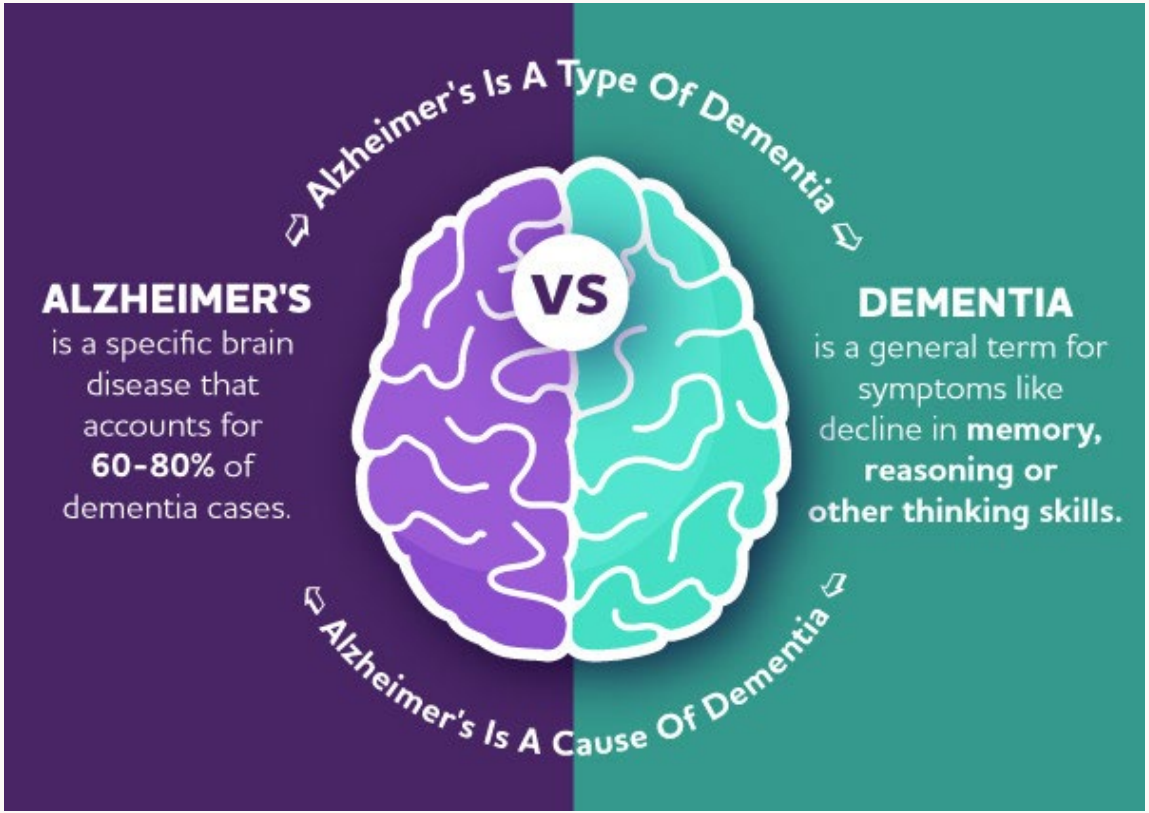
Alzheimer's is its own disease and no other forms.

Dementia

Dementia describes a group of symptoms associated with the decline of a person's ability to think, remember, and reason (Alzheimer's Association, 2019).

Dementia is the result of changes in certain brain regions that cause neurons (nerve cells) and their connections to stop working properly.

There are many types of dementia, such as vascular, lewy body, frontotemporal, and mixed dementia (National Institute on Aging, 2022).



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Commonalities between Alzheimer's and Dementia

Symptoms: long and short term memory loss, changes in mood and personality, impaired judgement, difficulty with reasoning, delusions and hallucinations

Causes: genetics, lifestyle factors (poor diet, smoking, obesity), vitamin deficiencies (B12, D), injuries (infection, head trauma)

Treatments : clinical trials, therapy, medications, mind stimulating activities, lifestyle changes

Prognosis: there is no cure for Dementia and Alzheimer's

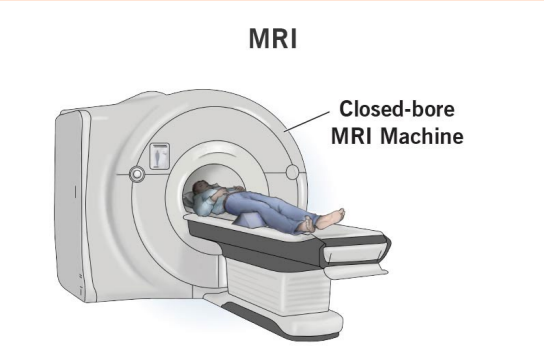
Preferred Imaging Modalities

Alzheimer's

MRI

Enhanced and Non-enhanced CT

PET



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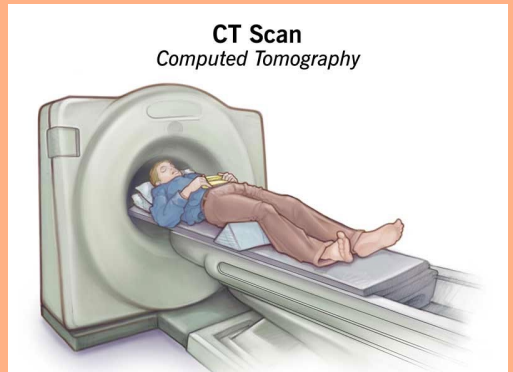
Dementia

MRI

Non-enhanced CT

PET



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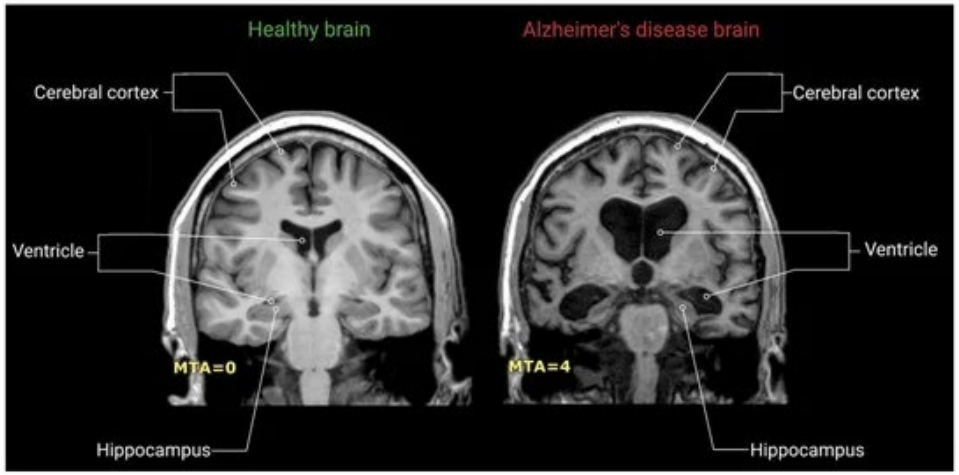
MRI and Alzheimer's

When looking at an MRI, the brain of someone with Alzheimer's will appear with enlarged ventricles and show shrinkage of the brain regions with parietal atrophy. MRI is able to detect the size and amount of cells within the hippocampus which is a determining factor in the deterioration of a brain with Alzheimer's.



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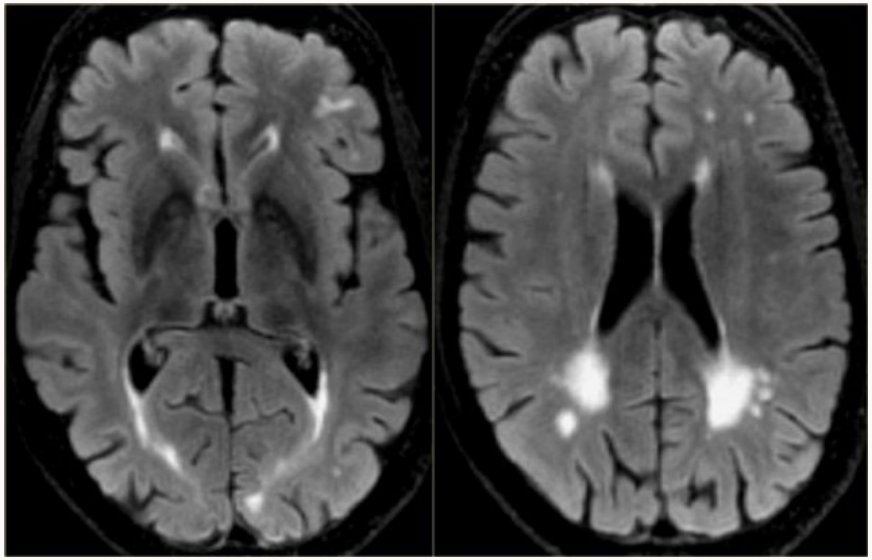
MRI and Dementia

When looking at an MRI, Dementia appears as brain atrophy (shrinkage) in areas of the brain. As parts of the brain start to shrink, ventricular enlargement will appear making the ventricles (fluid -filled spaces) appear larger than normal (National Institute on Aging, 2022).

There may also be white matter changes. This will appear as bright spots on the MRI scan, indicating damage to the tissue connecting different brain regions.



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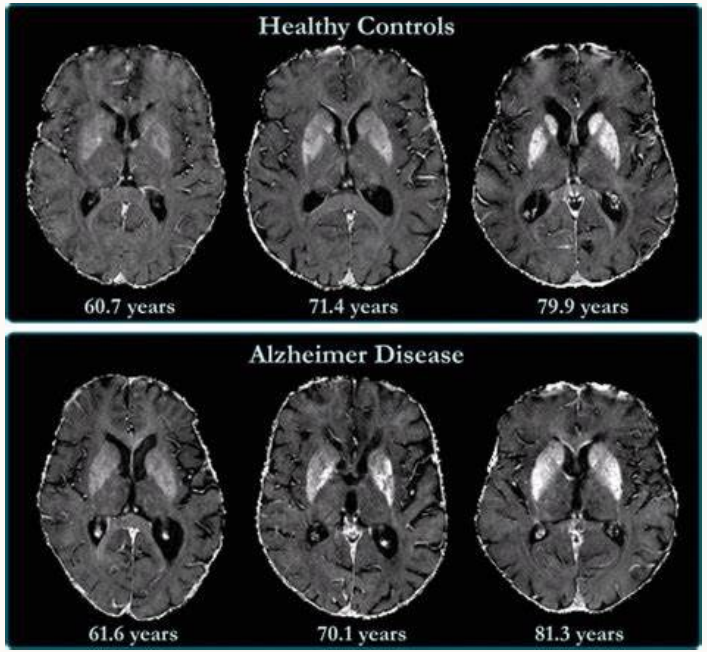
CT and Alzheimer's

Brain CT helps distinguish the difference between other neurological conditions that mimic Alzheimer's such as a hemorrhage, tumors and strokes (American Health Imaging, 2021).

CT scans can help detect the deterioration of brain mass associated with Alzheimer's. This is due to the amyloid plaques that form that eventually destroy the neurons within the brain.



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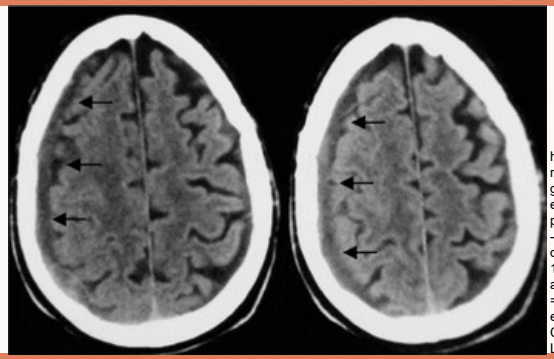
CT and Dementia

When looking at a CT Scan, Dementia appears as brain atrophy, showing shrinkage in different regions of the brain.

The fluid-filled cavities (ventricles) in the middle of the brain will start to expand, as brain cells start to die (Stanford Medicine, 2014).

The brain's cortex (outer layer) may start to degenerate. This can cause the ridges of the cortex to thin and the valleys to widen.



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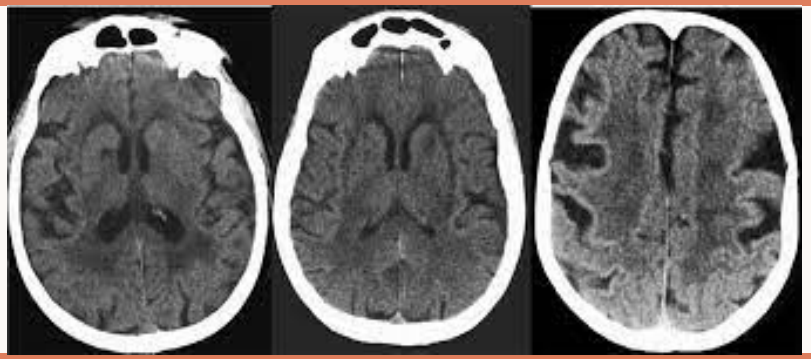

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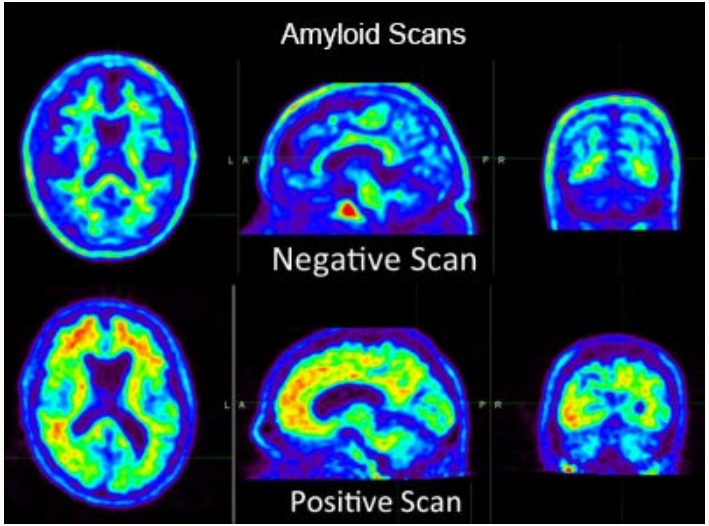
PET and Alzheimer’s

PET scans can be beneficial in helping with the diagnosis of Alzheimer’s specifically in identifying clusters of amyloid protein plaques within the brain. Before this scan, it would only be able to be diagnosed through an autopsy.
A specific PET scan (multitracer PET studies) can also be useful in a research aspect. This type of study strengthen the interpretation and understanding of underlying pathological disease in Alzheimer's and the relationship between the pathology and the cognitive impairment on the brain (Nordberg et al., 2010).



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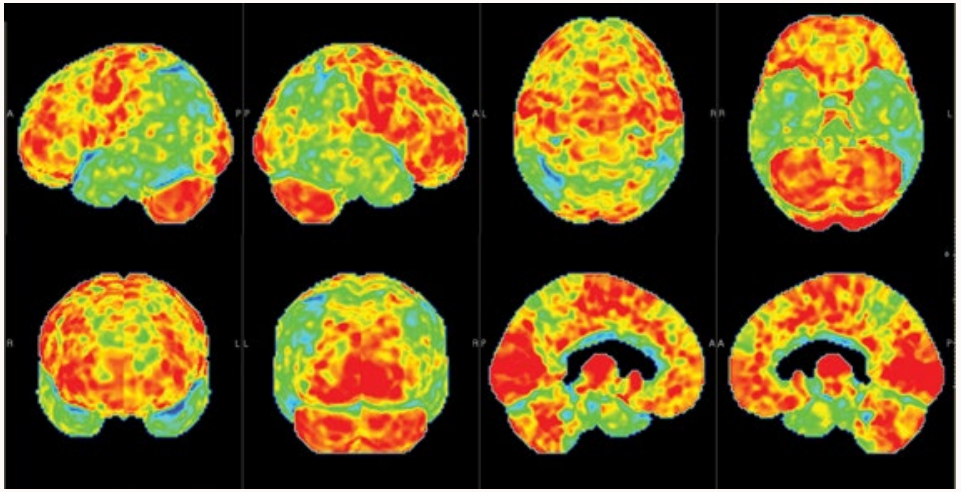
PET and Dementia

When looking at a PET Scan, Dementia will show metabolic impairment. This will show a loss of red color, and there will be an increase in yellow, blue, and green colors.

PET Scans can help measure the levels of different proteins such as beta -amyloid, tau protein, and glucose metabolism in the brain to help identify dementia (National Institute on Aging, 2022).



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Conclusion

- Alzheimer's and Dementia are diseases that are nearly identical but share significant differences that separate each other from one another
- Multiple imaging modalities aid in the diagnosis and progression monitoring
- Although similar, PET, CT, and MRI each show differences in Alzheimer's and Dementia

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