

■ Alzheimer's Disease — Complete Overview

Alzheimer's disease is a chronic, progressive neurodegenerative disorder that affects memory, thinking, and daily functioning. It is the leading cause of dementia, accounting for about 60–80% of all dementia cases.

■ Pathophysiology

Two hallmark protein abnormalities define Alzheimer's: β -amyloid plaques (outside neurons) and tau neurofibrillary tangles (inside neurons). These cause synaptic dysfunction, inflammation, and widespread neuronal death, particularly in the hippocampus and cortex.

■ Causes & Risk Factors

Genetic: APP, PSEN1, PSEN2 mutations (early onset); APOE $\epsilon 4$ allele (late onset).

Non-genetic: Aging, family history, head injury, diabetes, hypertension, smoking, and sedentary lifestyle.

■ Symptoms & Stages

- 1. Mild Stage:** Memory loss, misplacing items, mild confusion.
- 2. Moderate Stage:** Disorientation, speech issues, behavioral changes.
- 3. Severe Stage:** Loss of communication, total dependency, incontinence.

■ Diagnosis & Cognitive Tests

Diagnosis is clinical, supported by MMSE or MoCA tests and imaging. The Mini-Mental State Examination (MMSE) assesses orientation, recall, attention, and language (max 30 points).

MMSE Scoring:

25–30 = Normal

21–24 = Mild AD

10–20 = Moderate AD

<10 = Severe AD

■ Lab & Imaging Support

MRI/CT shows brain atrophy. PET and CSF tests show ↓A_β42 and ↑tau protein levels.

■ Assessing Severity

Severity tracking tools include MMSE, MoCA, FAST scale, and Clinical Dementia Rating (CDR).

■ Treatment

Pharmacologic: Donepezil, Rivastigmine, Galantamine (cholinesterase inhibitors); Memantine (NMDA antagonist).

Non-Pharmacologic: Cognitive therapy, physical exercise, nutrition, and social support.

■ Prognosis & Recent Advances

Average survival is 8–10 years after diagnosis. Emerging therapies include amyloid-clearing monoclonal antibodies (Aducanumab, Lecanemab) and AI-assisted cognitive monitoring.

■ Summary

Alzheimer's = memory loss + cognitive decline due to amyloid and tau pathology.

Early → forgetfulness, Middle → confusion, Late → dependency.

Diagnosis = clinical + MMSE + imaging.

Treatment = drugs + supportive care.