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# **A Clinical and Basic Science Review of Alzheimer's Disease: Review Article**

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**Abstract**--The purpose of this study is to provide a brief overview of Alzheimer's disease and a definition of moderate disability that includes (MCI). This paper focuses on the medical and cardiovascular properties of Alzheimer's disease and Parkinson's. This article also covers the recent advances in the use of biomarkers to diagnose Alzheimer's disease, as well as existing efforts to find new therapies. Alzheimer's disease (AD), the most common form of dementia, affects 50 lakh Indians aged 65 and over, or one in nine. A Clinical and Research Science Review of Alzheimer's Disease. There has been significant progress in identifying pre-dementia stages of Alzheimer's disease, such as MCI, as well as developing diagnosis and therapeutic procedures for treating Alzheimer's disease. Our ability to find a cure for Alzheimer's disease will be determined by our ability to find the right genetic markers for early diagnosis and clinical intervention in patients at risk, as well as a greater understanding of the cellular and molecular processes that go wrong. After the National Institutes of Health (NIA) recognised urgent need to develop clinically useful neuroimaging and other biomarkers for the early detection of Alzheimer's disease, the Alzheimer's Disease Neuroimaging Initiative (ADNI) was established in 2004.19

**Keywords**--Alzheimer's disease, fluid biomarkers, memory loss, minor cognitive dysfunction, treatment.

## **Introduction**

The number of people living with dementia is projected to rise from 30 lakh today to 60 lakh by 2040 as the world's population ages. Alzheimer's disease affects 5 million Indians over the age of 65, or one out of every nine people. According to the Centers for Disease Control and Prevention, 30 lakh older adults in India have asthma, 100 lakh have diabetes, 200 lakh have arthritis, and 250 lakh have hypertension (2011-2015 estimates). Primary care physicians and psychologists see a growing number of older people with memory loss over the course of their careers.<sup>1</sup> Dementia has such serious implications for patients, their families, and our society that all doctors should be aware of it. The aim of this review article is to provide a quick overview of Alzheimer's disease and the mild cognitive impairment it causes. The article's main argument is that medical students should be aware of the clinical and neurobiological aspects of Alzheimer's disease and moderate cognitive disability while studying medicine. In addition, the article addresses recent advances in the use of biomarkers to identify Alzheimer's disease, as well as ongoing efforts to develop new therapeutics.. 2

## **Disease of Alzheimer's**

Alois Alzheimer and Auguste D.

A German physician and a neuro-pathologist named Dr. Alois Alzheimer is said to be the first to develop dementia that would be considered Alzheimer's disease. Auguste D, a 51-year-old woman with a "unique cerebral cortex" who had been experiencing persistent memory loss of language, confusion, delusions (hallucinations, hallucinations, dementia), and mental instability, was identified by Alzheimer's speech. of the 1906 conference and the next paper of 1907.<sup>3</sup> Surprisingly, the vast scientific understanding and diagnosis of Alzheimer's disease over the past century is crucial to our knowledge of Alzheimer's disease at present.

## **Dementia**

Dementia is a medical condition characterised by a gradual decline in mental function.<sup>4</sup> It simply applies to memory loss. Dementia may impair memory, language, thinking, decision-making, visuospatial function, focus, and orientation, among other cognitive abilities. In people with dementia, personality changes, emotional regulation, and social experiences are often accompanied by cognitive impairments. Importantly, the cognitive and behavioural changes that accompany dementia have an effect on a person's ability to handle everyday tasks, as well as work, social interactions, and relationships (e.g., walking, and riding bike). Dementia may be caused by a variety of factors, both reversible and permanent.<sup>5</sup> Recurrent dementia (also called "pseudo-dementias") is a mental disorder that is caused by a medical condition, such as depression, malnutrition (eg ulcers (eg brain tumor), natural hydrocephalus, or substance abuse).<sup>6</sup>

## **Diagnosis of Alzheimer's disease**

The gold standard for Alzheimer's disease is an autopsy-based (post-mortem) clinical review. Alzheimer's disease is diagnosed and classified based on the

formation and distribution of amyloid and NFT plaques in the brain. Alzheimer's disease is found in clinical settings primarily in the patient's medical history, physical and neurological examinations, as well as neuropsychological examinations, as well as the omission of other etiologies with selected auxiliary diagnostics. The clinical diagnosis of Alzheimer's disease is 70-90 percent accurate compared to the diagnosis of the disease, with higher data available in professional settings such as memory loss clinics.<sup>8</sup> A team working at the National Institute of Aging-Association Alzheimer's (NIA-AA) 6 in 1984, which was last revised in 2011. The NIA-AA clinical guidelines for diagnosing "probable" Alzheimer's disease dementia are as follows.

Medical conditions for Alzheimer's disease dementia include:<sup>5</sup>

- There is a dementia scenario.
- Symptoms can last for months or even years.
- A trend of cognitive impairment is emerging.
- Amnestic (typical) or non-amnestic initial presentation (atypical)
- No proof exists that any cause of cognitive disability exists, such as cerebrovascular disease, other Alzheimer's disorders, or any other mental or medical condition.

When a patient's dysfunction has a poor clinical history or is thought to promote etiologies other than Alzheimer's disease, a diagnosis of Alzheimer's dementia is suggested. Patients with Alzheimer's disease often undergo physical and neurological examinations.

### **Treatment of Alzheimer's disease**

Alzheimer's syndrome has no remedy, and drug therapy is only in its early stages. Drugs approved to treat suspected Alzheimer's disease help control symptoms but do not slow or stop the disease from progressing.<sup>11</sup> Drugs that target the brain's neurotransmitter systems are now the mainstay in Alzheimer's disease treatment. Acetylcholinesterase inhibitors act by preventing acetylcholine from being degraded, thus increasing acetylcholine levels at the synapse and enhancing memory and concentration in Alzheimer's patients. Currently, the FDA has licenced three cholinesterase inhibitors: <sup>12</sup> rivastigmine, galantamine, and donepezil. Memantine, an NMDA (glutamate) receptor blocker, is another FDA-approved drug for moderate to severe Alzheimer's disease. Both classes of medications are generally well tolerated, with gastrointestinal pain, dizziness, and headache being the most frequent adverse effects.<sup>13</sup>

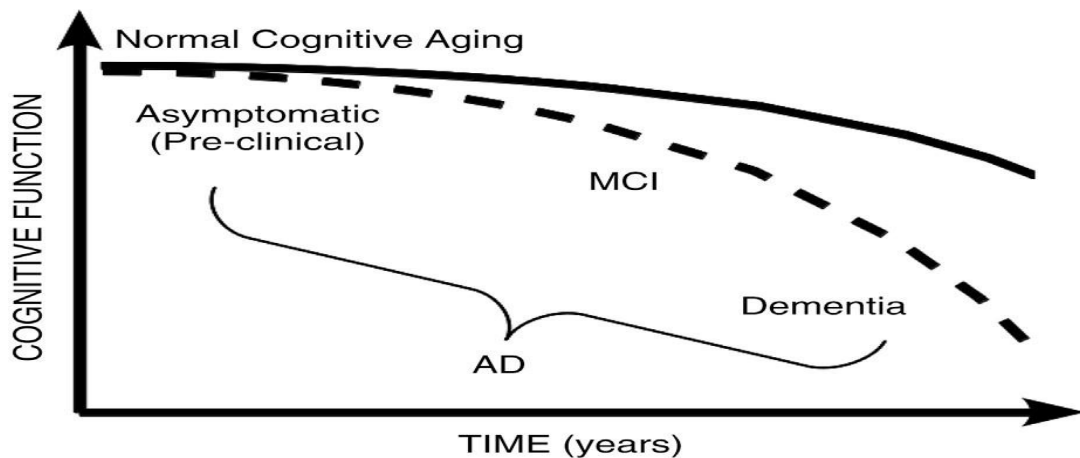


Figure 1. Adapted from ref <sup>14</sup>

### Mild cognitive impairment

Mild cognitive impairment is a disorder marked by knowledge and/or other mental skills dysfunction that go beyond the usual deterioration of comprehension that occurs with age. MCI is often thought to be a symptom to dementia or a step in the progression from healthy cognitive ageing to dementia.<sup>15</sup> It is also known as minor cognitive dysfunction. The Mayo Clinic's Petersen and colleagues suggested the most commonly used clinical guidelines for the detection of MCI.<sup>16</sup> Based on different neuropsychological profiles, several subtypes of MCI has been suggested. Non-recallable Mild cognitive impairment is defined by deficits in areas other than memory (e.g., executive function/attention, vocabulary, and visuospatial function), whereas amnesic dementia is defined by memory loss. Memory deficiency is the only symptom of mild cognitive impairment. Mild cognitive impairment is characterised by memory and non-memory function impairments.

Diagnostic criteria for mild cognitive disability<sup>17</sup>

- A subjective cognitive complaint ideally backed up by third-party proof.
- Memory and/or other mental disorders that are: a) Unusual for the person's age and education, as determined by neuropsychological testing; and b) Rare for the person's age and education, as determined by neuropsychological testing. c) Indicate a drop in output from previous levels.
- Willingness to carry out everyday activities in a normal manner
- Dementia is not present<sup>17</sup>

### Fluid biomarkers

Protein biomarkers extracted from CSF and blood plasma are also being used to study Alzheimer's disease. According to several studies using immunoassays to measure protein levels different from CSF, Alzheimer's patients have low levels of 42 amino acid isoform Ab peptide and high levels of phosphorylated tau (P-tau) peptide. Plasma biomarkers have been suggested as an alternative to CSF

biomarkers for early detection of Alzheimer's disease in 2007.<sup>19</sup> Other studies looking at the therapeutic effectiveness of cell-signaling, immune, metabolic, and disease-related plasma proteins have yielded mixed results in recent years. To summarise, more research is required to standardise CSF and plasma protein concentrations, as well as to evaluate the clinical utility of protein biomarkers in Alzheimer's disease diagnosis.<sup>20</sup> Multi-domain Mild cognitive impairment is characterised by memory and non-memory function impairments.<sup>21</sup>

## Conclusion

Since Alois Alzheimer's reported first case more than a hundred years ago, great strides have been made in diagnosing and treating Alzheimer's disease. Identifying the pre-dementia stages of Alzheimer's disease, such as mild cognitive impairment, and improving diagnostic and therapeutic approaches to treating Alzheimer's disease has made great strides. Finding the right biomarkers for early detection and therapeutic interventions for at-risk patients, as well as a better understanding of malignant cellular and cellular processes, will determine our ability to find a cure for Alzheimer's disease. The Alzheimer's Disease Neuroimaging Initiative (ADNI) was established in 2004. The National Institutes of Health recognized the urgent need to practice appropriate neuroimaging with other biomarkers to diagnose Alzheimer's disease. Alzheimer's Neuroimaging Initiative is a public-private partnership aimed at collecting longitudinal neuroimaging data, psychological data, neuropsychological tests, and biological variants (blood and CSF) from people with mild mental illness, Alzheimer's disease, and individuals stable elders. The Framingham Heart Study is the closest course to the Framingham heart study. Alzheimer's Neuroimaging Initiative and other major approaches are expected to accelerate our understanding of dementia and Alzheimer's disease, as well as promote the development of more effective Alzheimer's treatments than at present.

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