

Alzheimer's Disease: An Overview

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Introduction

Alzheimer's Disease (AD) is a slowly progressing neurological disease that gets worse over time. It is thought to be the cause of 60–70% of dementia cases. The most common early symptom is difficulty recalling recent events. As the illness advances, language issues, disorientation (including getting lost easily), mood changes, loss of desire, self-neglect, and behavioural concerns are all possible indicators. When a person's health begins to worsen, they often withdraw from family and society. The body's functioning diminishes over time, finally leading to death. The usual life expectancy following diagnosis is three to nine years, despite the fact that the rate of progression varies.

Description

Alzheimer's disease is a disease with no recognised cause. Its growth is influenced by a variety of environmental and genetic variables. The most potent genetic risk factor is an allele of the APOE gene. Risk factors include a history of brain injury, severe depression, and high blood pressure. Amyloid plaques, neurofibrillary tangles, and neuronal connection loss in the brain are all associated to the disease process. A probable diagnosis is based on the patient's medical history and cognitive testing with medical imaging and blood tests to rule out other possible causes. Early symptoms are sometimes misunderstood as natural indicators of ageing. Brain tissue must be analysed for a conclusive diagnosis, but this can only be done after death. In 2019, scientific experiments to test these possibilities were on-going. A healthy diet, physical activity, and social interaction are all known to help with ageing, and these factors may also help to lower the incidence of cognitive decline and Alzheimer's disease. No researches have been done to show that certain medicines or supplements can lower risk [1-3].

While certain treatments can temporarily alleviate symptoms, none can stop or reverse the disease's progression. People who are affected become more dependent on others for assistance, putting a pressure on carers. There could be social, psychological, physical, and financial strains. Exercise programmes may be beneficial in terms of day-to-day activities and can perhaps improve outcomes. Antipsychotics are widely used to treat behavioural problems or psychoses induced by dementia, but they're rarely recommended because they're ineffective and increase the danger of premature death.

Alzheimer's disease is divided into three stages, each of which is characterised by a progressive deterioration in cognitive and functional abilities. The three stages are early or mild, middle or moderate, and late or severe. The hippocampus, which is linked to memory and is the source of the first signs of memory loss, is known to be affected by the illness [4,5].

Abnormal amounts of amyloid beta, which accumulates extracellularly as amyloid plaques, and tau proteins, which accumulate intracellularly as

neurofibrillary tangles, are thought to cause Alzheimer's disease by disrupting neuronal function and connectivity, leading to progressive loss of brain function. This diminished ability to eliminate proteins is connected to age, is influenced by brain cholesterol, and has been linked to other neurodegenerative diseases.

The medical history, family history, and behavioural observations are commonly used to make an Alzheimer's disease diagnosis. The diagnosis is supported by the lack of other disorders and the existence of specific neurological and cognitive traits. To rule out other types of dementia or subtypes, advanced medical imaging, such as Computed Tomography (CT) or magnetic resonance imaging (MRI), as well as Single-photon Emission Computed Tomography (SPECT) or Positron Emission Tomography (PET), can be used. Furthermore, it has the ability to predict Alzheimer's disease progression from the prodromal stages (mild cognitive impairment). FDA-approved radiopharmaceutical diagnostic agents used in PET for patients with Alzheimer's disease include florbetapir (2012), flumetamol (2013), florbetaben (2014), and flortaucipir (2020). As of 2018, its use in clinical practice is mostly limited to clinical trials due to the fact that many insurance companies in the United States do not cover this operation [5-9].

To aid in the diagnosis of cognitive problems in Alzheimer's disease, cognitive tests such as the Mini-Mental State Examination (MMSE), the Montreal Cognitive Assessment (MoCA), and the Mini-Cog are often utilised. These tests may not always be accurate, as they lack sensitivity to mild cognitive impairment and can be biased by language or focus challenges; more comprehensive test arrays, especially in the early stages of the disease, are required for high findings reliability. A neurological examination in early Alzheimer's disease will usually produce normal results, with the exception of apparent cognitive impairment, which may not differ from that produced by other diseases processes, such as various varieties of dementia.

A decline in cholinergic cell activity is a well-known feature of Alzheimer's disease. Acetyl cholinesterase inhibitors reduce the breakdown of acetylcholine (ACh), hence increasing ACh content in the brain and counteracting ACh loss caused by cholinergic neuron death. These medications appear to be beneficial in mild to moderate Alzheimer's disease, with some evidence suggesting they are also effective in advanced stages. In patients with modest cognitive impairment, these drugs have not been demonstrated to slow the onset of Alzheimer's disease. The most common side effects are nausea and vomiting, both of which are linked to cholinergic excess.

Conclusion

Alzheimer's disease study aims to detect the disease before symptoms develop. To aid with early diagnosis, a number of biochemical assays have been established. Among the tests available are those for beta-amyloid, total tau protein, and phosphorylated tau181P protein in cerebrospinal fluid. CSF draws are avoided on a regular basis since they are unpleasant. A blood test for circulating miRNA and inflammatory biomarkers could be another sign.

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