

Cause and Prevention of Alzheimer's Disease

Zhao Chen*

Department of Neurology, Xuanwu Hospital, Capital Medical University, Beijing, China

Perspective

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***For Correspondence:**

Zhao Chen, Department of Neurology,

Xuanwu Hospital, Capital Medical

University, Beijing, China

E-mail: chen@163.com

DESCRIPTION

The exact causes of Alzheimer's disease isn't fully understood, but on a fundamental level, brain proteins malfunction, which interferes with the operation of brain cells (neurons) and sets off a chain of harmful events. This interferes with the function of the damaged brain cells and sets off a toxic cascade, which ultimately results in cell death and later brain atrophy. According to current theories, Amyloid beta (A) builds up abnormally in the brain, either extracellularly as tau and amyloid plaques or intracellularly as neurofibrillary tangles, disrupting neuronal connection and functioning and causing a progressive loss of brain function. controlled by brain cholesterol, and linked to other neurodegenerative conditions.

The Researchers can now observe changes in brain structure and function as well as the growth and spread of aberrant tau and amyloid proteins in the living brain thanks to advancements in brain imaging technology. When fragments group together, neurons experience a toxic impact that impairs cell-to-cell communication. Thus, larger deposits known as amyloid plaques continue to develop. Tau proteins are in charge of carrying nutrients and other necessary elements within neurons as part of their internal support and transport mechanism. Neurofibrillary tangles are made up of tau proteins that have developed abnormal shapes as a result of Alzheimer's disease. The tangles poison cells and interfere with the transport system.

With the exception of 1%-2% of cases in which deterministic genetic abnormalities have been discovered, the cause of the majority of Alzheimer's cases is still largely unknown. There are several conflicting theories that seek to explain the underlying reason; the two most popular theories are the cholinergic hypothesis and the Amyloid beta (A) hypothesis.

The cholinergic hypothesis, which contends that decreased synthesis of the neurotransmitter acetylcholine is what causes Alzheimer's disease, is the oldest theory and the foundation for the majority of pharmacological therapy. One of the main characteristics of Alzheimer's disease progression is the loss of cholinergic neurons found in the limbic

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system and cerebral cortex. The extracellular Amyloid beta (A) deposits were proposed as the primary cause of the disease in the 1991 amyloid hypothesis. The Amyloid Precursor Protein (APP) gene's position on chromosome 21 and the fact that people with trisomy 21 (Down syndrome), who have an extra gene copy, nearly uniformly show at least the first signs of Alzheimer's disease by the age of 40, provide evidence in favour of this hypothesis. Alzheimer's disease can only be diagnosed with certainty through autopsy evidence. Up to 23% of people who receive a clinical diagnosis of AD may not actually have the disease; instead, they may have pathology that points to another illness with symptoms similar to AD.

AD is often diagnosed clinically based on the patient's medical history, family history, and behavioural observations. The diagnosis is supported by the presence of distinctive neurological and cognitive characteristics and the absence of other diagnoses. To assist rule out other cerebral pathology or dementia subtypes, advanced medical imaging techniques including Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Single-Photon Emission Computed Tomography (SPECT), and Positron Emission Tomography (PET) can be used. Additionally, it might indicate the transition from moderate cognitive impairment (prodromal stages) to Alzheimer's disease. Its use in clinical practice is limited because many insurance companies in the United States do not cover this surgery. Memory tests and assessments of intellectual functioning can be used to further define the condition. To facilitate and standardise the diagnostic process for practicing physicians, medical organisations have developed diagnostic criteria. Only post-mortem examinations that use brain tissue that can be histologically evaluated for senile plaques and neurofibrillary tangles can provide a definitive diagnosis.