

## GENERAL UNDERSTANDING OF ALZHEIMER'S DISEASE

**Fayziyeva Shaxlo Raxmanovna**

Center for the Development of Professional  
Qualifications of Medical Personnel  
Tashkent, Uzbekistan

**Abstract:** Alzheimer's disease is a progressive neurodegenerative disease of the central nervous system, characterized mainly by a gradual decline in cognitive functions, in particular memory, thinking and speech. This article analyzes the etiological factors of the disease, pathogenesis mechanisms, clinical symptoms, and modern diagnostic and treatment approaches. Also, risk factors and preventive measures affecting the development of the disease are highlighted based on scientific sources. The results of the study indicate that an integrated approach is important in early detection of Alzheimer's disease and slowing its progression.

**Keywords:** Alzheimer's disease, dementia, neurodegeneration, cognitive impairment, memory loss, diagnosis, treatment, prevention.

### INTRODUCTION

Alzheimer's disease (synonyms: idiopathic syndrome, tremor paralysis (tremor of the limbs), also Alzheimer's disease senile dementia) is the most common form of dementia, a neurodegenerative disease. It was first described in 1907 by the German psychiatrist Alois Alzheimer. (1864-1915). It occurs in people over 65 years of age. In 2006, 26.6 million people accounted for the global incidence, and by 2050 the number of patients may increase fourfold.

The disease begins with subtle symptoms and progresses over time. Often, short-term memory impairment is observed in the early stages, for example; inability to recall recently learned information. As the disease progresses, long-term memory is lost, speech and cognitive impairment occur, and the patient loses a sense of indifference and self-confidence in the environment. There is a gradual loss of body functions and can lead to death.

Currently, there is not enough information about the causes and course of Alzheimer's disease. The main symptoms of the disease are the accumulation of amyloid plaques and neurofibrillary tangles in brain tissue. Current treatments provide some relief, but so far they do not allow to stop or slow the progression of the disease. In 2013, Deep Transcranial Magnetic Stimulation (Deep TMS) was approved by the agencies for the treatment of symptoms of Alzheimer's disease. Pfizer and Johnson & Johnson have announced that all other research in this area has been stopped. Currently, there is no specific drug that can prevent or cure Alzheimer's disease. Many methods have been proposed to prevent Alzheimer's disease, but there is no information about the effect on the course of the disease and its severity. Physical exercise, mental activity, and a diet are often recommended to prevent and control the disease

### METHODS

To diagnose the disease and establish treatment, preliminary examination methods are performed. First, an anamnesis is collected: the time of onset of the disease, causes, influencing factors, an interview with close relatives is conducted. Then, if the patient has indications for radiological examinations, MRI, MSCT, CT scan, screening procedures are performed.

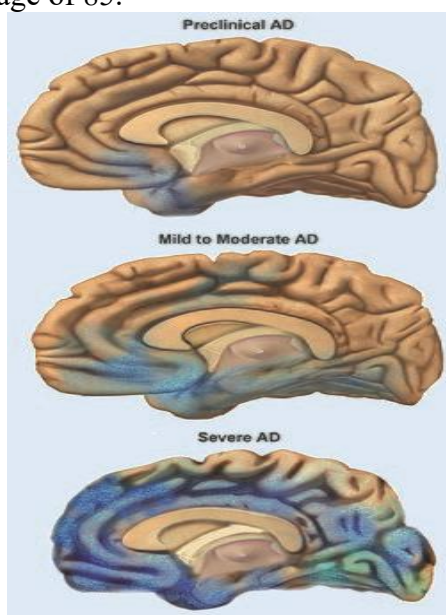
When Alzheimer's symptoms are suspected, a series of cognitive tests are performed to confirm the diagnosis, and if possible, magnetic resonance imaging (MRI) is performed. Individual prognosis is difficult due to the variability in the course of the disease, which can develop insidiously for a long time before symptoms become noticeable and a diagnosis is made.



The average life expectancy after diagnosis is about seven years, with less than three percent of patients surviving beyond fourteen years.

Less than 10% of patients under the age of 60 are due to autosomal dominant (familial) mutations, accounting for less than 0.01% of the total. When mutations are detected in the APP, presenilin 1, and presenilin 2 genes, most of them increase the synthesis of the small protein Abeta42, a major component of senile plaques.

Long-term studies (primarily of healthy populations followed for years) have shown that there are 10-15 new cases of all types of dementia per 1,000 people, and 5-8 cases of Alzheimer's disease. Age is the main risk factor reflected in statistics: the risk of developing dementia approximately doubles every 5 years after the age of 65, from 3 cases at age 65 to 69 cases per 1,000 people by age 95. The incidence of Alzheimer's disease in women is particularly high after the age of 85.



## RESULTS

The disease is characterized by the loss of neurons and synaptic connections in the cerebral hemispheres and certain subcortical areas. Due to cell death, the parietal and temporal lobes, frontal cortex areas, and cingulate gyrus are severely atrophied in the affected areas.

Postmortem analysis of brain samples from patients clearly shows both amyloid plaques and neurofibrillary tangles under the microscope. Inside and outside neurons, beta-amyloid is a dense, insoluble substance that forms in the extracellular matrix. It grows inside nerve cells and forms fibers called insoluble tangles. Most older people have some plaques and tangles in the brain, but in Alzheimer's disease, plaques and tangles are more common in certain areas of the brain, such as the temporal lobes.

Alzheimer's disease is always a proteinopathy characterized by the accumulation of abnormally folded proteins - beta-amyloid and tau proteins - in brain tissue. These transmembrane proteins play an important role in neuronal growth, damage, and recovery after damage. In Alzheimer's disease, for unknown reasons, APP undergoes proteolysis and is cleaved into peptides by enzymes. In the intercellular space, beta-amyloid filaments formed by peptides stick together and turn into dense formations called senile plaques.

In Alzheimer's disease, there is insufficient information about the disruption of the synthesis of beta-amyloid peptides, and their subsequent accumulation and pathological abnormalities. In the amyloid hypothesis, the accumulation of beta-amyloid is the main event



that triggers the process of neuronal degeneration. These disrupt the homeostasis of calcium ions in the cell and trigger apoptosis. A $\beta$  accumulates in the mitochondria of neurons, which affects the use of glucose by regulating the work of certain enzymes.

## DISCUSSION

Foods such as the Mediterranean diet, which includes bread, whole grains, fruits and vegetables, olive oil and other cereals, fish, and red wine, are very beneficial in reducing the risk and delaying the progression of Alzheimer's. Certain vitamins, including B3, C, B12, and folic acid, have been linked to a reduced risk of the disease in some studies, but other studies have not shown a significant effect on the onset, course, or side effects of the disease. Curcumin, found in common spices, has been shown to prevent certain pathological changes in the brain in mice.

Some studies have suggested that exposure to occupational magnetic fields, aluminum, or solvents may increase the risk of developing Alzheimer's disease in people who use metals such as aluminum. Some of these publications have been criticized for poor quality, and other studies have found little evidence of the role of environmental factors in the development of Alzheimer's disease.

In addition, a number of treatments have been developed to prevent Alzheimer's disease, stop its progression, and alleviate symptoms. The effectiveness of treatment depends on early detection and timely diagnosis. If the disease is detected earlier, all measures taken will be even more effective.

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