Alzheimer's Disease

Introduction - Alzheimer's disease

Alzheimer’s disease is an irreversible, progressive brain disease that slowly destroys memory and thinking skills and, eventually even the ability to carry out the simplest tasks of daily living. In most people with Alzheimer’s, symptoms first appear after age 60. Alzheimer’s disease is the most common cause of dementia among older people.

The disease is named after Dr. Alois Alzheimer. In 1906, Dr. Alzheimer noticed changes in the brain tissue of a woman who had died of an unusual mental illness. Her symptoms included memory loss, language problems, and unpredictable behavior. After she died, he examined her brain and found many abnormal clumps (now called amyloid plaques) and tangled bundles of fibers (now called neurofibrillary tangles).

Plaques and tangles in the brain are two of the main features of Alzheimer’s disease. The third is the loss of connections between nerve cells (neurons) in the brain.

Although treatment can slow the progression of Alzheimer’s and help manage symptoms in some people, currently there is no cure for this devastating disease.

Brain in Alzheimer's disease

Although we still don’t know how the Alzheimer’s disease process begins, it seems likely that damage to the brain starts a decade or more before problems become evident. During the preclinical stage of Alzheimer’s disease, people are free of symptoms, but toxic changes are taking place in the brain. Abnormal deposits of proteins form amyloid plaques and tau tangles throughout the brain, and once-healthy neurons begin to work less efficiently. Over time, neurons lose the ability to function and communicate with each other, and eventually they die.

Before long, the damage spreads to a nearby structure in the brain called the hippocampus, which is essential in forming memories. As more neurons die, affected brain regions begin to shrink. By the final stage of Alzheimer’s, damage is widespread, and brain tissue has shrunk significantly.

Stages in Alzheimer’s disease

Alzheimer’s is a slow disease that progresses in three stages—an early, preclinical stage with no symptoms, a middle stage of mild cognitive impairment, and a final stage of Alzheimer’s

dementia. The time from diagnosis to death varies—as little as 3 or 4 years if the person is older than 80 when diagnosed to as long as 10 or more years if the person is younger.

Dementia

Dementia is the loss of cognitive functioning—thinking, remembering, and reasoning—and behavioral abilities to such an extent that it interferes with a person's daily life and activities. Dementia ranges in severity from the mildest stage, when it is just beginning to affect a person's functioning, to the most severe stage, when the person must depend completely on others for basic activities of daily living.

Many conditions and diseases cause dementia. Two of the most common causes of dementia in older people are Alzheimer's disease and *vascular dementia*, which is caused by a series of strokes or changes in the brain's blood supply.

Other conditions that may cause memory loss or dementia include:

- medication side effects
- chronic alcoholism
- tumors or infections in the brain
- blood clots in the brain
- vitamin B12 deficiency
- some thyroid, kidney, or liver disorders

Many of these conditions are temporary and reversible, but they can be serious and should be treated by a doctor as soon as possible.

Emotional problems, such as stress, anxiety, or depression, can make a person more forgetful and can be mistaken for dementia. For instance, someone who has recently retired or who is coping with the death of a spouse may feel sad, lonely, worried, or bored. Trying to deal with these life changes leaves some people confused or forgetful. The emotional problems can be eased by supportive friends and family, but if these feelings last for a long time, it is important to get help from a doctor or counselor.

Alzheimer Causes

- Age-related changes in the brain
- Genetics
- Environmental/lifestyle factors

Scientists don’t yet fully understand what causes Alzheimer's disease, but it has become increasingly clear that it develops because of a complex series of events that take place in the brain over a long period of time. It is likely that the causes include some mix of genetic, environmental, and lifestyle factors. Because people differ in their genetic make-up and lifestyle, the importance of any one of these factors in increasing or decreasing the risk of developing Alzheimer's differs from person to person.

Age-related changes in the brain

One of the great mysteries of Alzheimer’s disease is why it largely strikes older adults. Research on how the brain changes normally with age is shedding light on this question. For example, scientists are learning how age-related changes in the brain may harm neurons and contribute to Alzheimer’s damage.

Genetics

The more researchers learn about Alzheimer's disease, the more they realize that genes play an important role in its development.

Early-onset Alzheimer’s is a rare form of the disease. It occurs in people age 30 to 60 and represents less than 5 percent of all people who have Alzheimer’s disease. Most cases of early-onset Alzheimer’s are familial Alzheimer’s disease, caused by changes in one of three known genes inherited from a parent.

Most people with Alzheimer’s disease have “late-onset” Alzheimer’s, which usually develops after age 60. Many studies have linked the apolipoprotein E (APOE) gene to late-onset Alzheimer’s. This gene has several forms. One of them, APOE ε4, seems to increase a person’s risk of getting the disease. However, carrying the APOE ε4 form of the gene does not necessarily mean that a person will develop Alzheimer’s disease, and people carrying no APOE ε4 can also develop the disease.

Most experts believe that additional genes may influence the development of late-onset Alzheimer’s. Scientists around the world are searching for these genes, and have identified a number of common genes in addition to APOE ε4 that may increase a person’s risk for late-onset Alzheimer’s.

Environmental/lifestyle factors

Research also suggests that a host of factors beyond basic genetics may play a role in the development and course of Alzheimer's disease. There is a great deal of interest, for example, in associations between cognitive decline and vascular and metabolic conditions such as heart disease, stroke, high blood pressure, diabetes, and obesity. Understanding these relationships and testing them in clinical trials will help us understand whether reducing risk factors for these conditions may help with Alzheimer's as well.

Alzheimer's Disease: Symptoms

- Very early signs and symptoms
- Mild Alzheimer's disease
- Moderate Alzheimer's disease
- Severe Alzheimer's disease

The course of Alzheimer's disease is not the same in every person, but symptoms seem to develop over the same general stages. In most people with Alzheimer's, symptoms first appear after age 60.

Scientists now know that Alzheimer's progresses on a spectrum with three stages—an early, preclinical stage with no symptoms; a middle stage of mild cognitive impairment (MCI); and a final stage of Alzheimer's dementia. At this time, doctors cannot predict with any certainty which people with MCI will or will not develop Alzheimer's.

Very early signs and symptoms

Memory problems are typically one of the first signs of Alzheimer's disease. Sometimes, other thinking problems, such as trouble finding the right words or poor judgment, are most prominent early on.

Mild Alzheimer's disease

As the disease progresses, memory loss worsens, and changes in other cognitive abilities are evident. Problems can include:

- getting lost
- trouble handling money and paying bills
- repeating questions
- taking longer to complete normal daily tasks

- poor judgment
- losing things or misplacing them in odd places
- mood and personality changes

Alzheimer's disease is often diagnosed at this stage.

Moderate Alzheimer's disease

In this stage, damage occurs in areas of the brain that control language, reasoning, sensory processing, and conscious thought. Symptoms may include:

- increased memory loss and confusion
- problems recognizing family and friends
- inability to learn new things
- difficulty carrying out tasks that involve multiple steps (such as getting dressed)
- problems coping with new situations
- hallucinations, delusions, and paranoia
- impulsive behavior

Severe Alzheimer's disease

People with severe Alzheimer's cannot communicate and are completely dependent on others for their care. Near the end, the person may be in bed most or all of the time as the body shuts down. Their symptoms often include:

- inability to communicate
- weight loss
- seizures
- skin infections
- difficulty swallowing
- groaning, moaning, or grunting
- increased sleeping
- lack of control of bowel and bladder

Alzheimer's Disease: Diagnosis

Memory loss or possible Alzheimer's?

If you are concerned about changes in memory and thinking or changes in senses, behavior, mood, or movement that do not seem normal in yourself or a family member

(see Symptoms for more information), talk with a doctor. A doctor can administer a brief memory screening test that can help detect problems, and can also do a complete exam to find out if a physical or mental health issue is causing the problem.

Diagnosis of Alzheimer's disease

A definitive diagnosis of Alzheimer's disease can be made only through autopsy after death, by linking clinical measures with an examination of brain tissue. However, doctors have several methods and tools to help them determine fairly accurately whether a person who is having memory problems has "possible Alzheimer's disease" (symptoms may be due to another cause), "probable Alzheimer's disease" (no other cause for the symptoms can be found), or some other problem.

To diagnose Alzheimer's, doctors may:

- ask questions about overall health, past medical problems, ability to carry out daily activities, and changes in behavior and personality
- conduct tests of memory, problem solving, attention, counting, and language
- carry out standard medical tests, such as blood and urine tests, to identify other possible causes of the problem
- perform brain scans, such as computed tomography (CT) or magnetic resonance imaging (MRI), to distinguish Alzheimer's from other possible causes for symptoms

These tests may be repeated to give doctors information about how the person's health and memory are changing over time. Tests can also help diagnose other causes of memory problems, such as mild cognitive impairment and vascular dementia.

Options for further assessment and diagnosis

If a primary care doctor suspects mild cognitive impairment or possible Alzheimer's, he or she may refer you to a specialist who can provide a detailed diagnosis, or you may decide to go to a specialist for further assessment. Specialists include:

- **Geriatricians**, who manage health care in older adults. They know how the body changes as it ages and whether symptoms indicate a serious problem.
- **Geriatric psychiatrists**, who specialize in the mental and emotional problems of older adults and can assess memory and thinking problems

- **Neurologists**, who specialize in abnormalities of the brain and central nervous system and can conduct and review brain scans
- **Neuropsychologists**, who can conduct tests of memory and thinking

You may also want to get a second opinion. Diagnosis of memory and thinking problems can be challenging. Subtle signs and symptoms may be overlooked or unclear. Getting a second opinion helps confirm the diagnosis. Most doctors understand the benefit of a second opinion and will share your records if you permit. A specialist can refer you to another doctor for a second opinion, or you may decide to find one yourself.

Benefits of early diagnosis

Early, accurate diagnosis is beneficial for several reasons. Beginning treatment early on in the disease process can help preserve function for some time, even though the underlying Alzheimer's process cannot be changed.

Having an early diagnosis helps people with Alzheimer's and their families:

- plan for the future
- make living arrangements
- take care of financial and legal matters
- develop support networks

In addition, an early diagnosis can provide greater opportunities for people with Alzheimer's disease to get involved in clinical trials. Clinical trials are research studies in which scientists test the safety, side effects, or effectiveness of a medication or other intervention.

New methods for diagnosing Alzheimer's disease being studied

Scientists are exploring ways to help physicians diagnose Alzheimer's disease earlier and more accurately. The ultimate goal is a reliable, valid, and inexpensive diagnostic test that can be used in any doctor's office.

Some studies focus on changes in personality and mental functioning, measured through memory and recall tests, which might point to early Alzheimer's or predict whether individuals are at higher risk of developing the disease. Other studies are examining the relationship between early damage to brain tissue and outward clinical signs.

Another very promising area of diagnostic research is the analysis of body fluids—blood and cerebrospinal fluid—to look for the proteins *tau* and beta-amyloid which are commonly found in people with Alzheimer's. In addition, scientists have developed sophisticated

imaging systems that may help measure the earliest changes in brain function or structure to identify people in the very first stages of Alzheimer's—well before they develop obvious signs or symptoms.

Treatment

Alzheimer's disease is complex, and it is unlikely that any one intervention will be found to delay, prevent, or cure it. That's why current approaches in treatment and research focus on several different aspects, including helping people maintain mental function, managing behavioral symptoms, and slowing or delaying the symptoms of the disease.

Treatments for managing behavioral symptoms

Common behavioral symptoms of Alzheimer's include sleeplessness, agitation, wandering, anxiety, anger, and depression. Scientists are learning why these symptoms occur and are studying new treatments—drug and non-drug—to manage them. Treating behavioral symptoms often makes people with Alzheimer's more comfortable and makes their care easier for caregivers.

Alzheimer's Disease: Risk Factors and Prevention

We can't control some risk factors for Alzheimer's disease such as age and genetic profile. But scientists are studying a number of other factors that could make a difference. Research suggests that certain lifestyle factors, such as a nutritious diet, exercise, social engagement, and mentally stimulating pursuits, might help to reduce the risk of cognitive decline and Alzheimer's disease. Scientists are investigating associations between cognitive decline and heart disease, high blood pressure, diabetes, and obesity. Understanding these relationships and testing them in clinical trials will help us understand whether reducing risk factors for these diseases may help with Alzheimer's as well

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