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## Alzheimer's Disease Fact Sheet

Alzheimer's disease is a brain disorder that slowly destroys memory and thinking skills, and eventually, the ability to carry out the simplest tasks. In most people with Alzheimer's, symptoms first appear later in life. Estimates vary, but experts suggest that more than 6 million Americans, most of them age 65 or older, may have Alzheimer's.

Alzheimer's is currently ranked as the seventh leading cause of death in the United States and is the most common cause of dementia among older adults.

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 help with basic activities of daily living.

> [Share this infographic](#) and help spread the word about understanding different types of dementia.

The causes of dementia can vary depending on the types of brain changes that may be taking place. Other forms of dementia include [Lewy body dementia](#), [frontotemporal disorders](#), and [vascular dementia](#). It is common for people to have [mixed dementia](#) — a combination of two or more types of dementia. For example, some people have both Alzheimer's and vascular dementia.

Alzheimer's 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, or tau, tangles).

These plaques and tangles in the brain are still considered some of the main features of Alzheimer's. Another feature is the loss of connections between neurons in the brain. Neurons transmit messages between different parts of the brain, and from the brain to muscles and organs in the body.

### **How does Alzheimer's disease affect the brain?**

Scientists continue to unravel the complex brain changes involved in Alzheimer's. Changes in the brain may begin a decade or more before symptoms appear. During this very early stage of Alzheimer's, toxic changes are taking place in the brain, including abnormal buildups of proteins that form amyloid plaques and tau tangles. Previously healthy neurons stop functioning, lose connections with other neurons, and die. Many other complex brain changes are thought to play a role in Alzheimer's as well.

The damage initially appears to take place in the hippocampus and the entorhinal cortex, which are parts of the brain that are essential in forming memories. As more neurons die, additional parts of the brain are affected and begin to shrink. By the final stage of Alzheimer's, damage is widespread and brain tissue has shrunk significantly.

### **Signs and symptoms of Alzheimer's disease**

[Memory problems](#) are typically one of the first signs of cognitive impairment related to Alzheimer's. Some people with memory problems have a condition called [mild cognitive impairment](#) (MCI). With MCI, people have more memory problems than normal for their age, but their symptoms do not interfere with their everyday lives. Movement difficulties and problems with the sense of smell have also been linked to MCI. Older people with MCI are at greater risk for developing Alzheimer's, but not all of them do so. Some may even revert to normal cognition.

The first symptoms of Alzheimer's vary from person to person. For many, decline in nonmemory aspects of cognition, such as word finding, vision/spatial issues, and impaired reasoning or judgment may signal the very early stages of the disease. Researchers are studying [biomarkers](#) (biological signs of disease found in brain images, cerebrospinal fluid, and blood) to detect early changes in the brains of people with MCI and in cognitively normal people who may be at greater risk for Alzheimer's. More research is needed before these techniques can be used broadly.

and routinely to diagnose Alzheimer's in a health care provider's office.

## **Stages of Alzheimer's disease**

### **Mild Alzheimer's disease**

As Alzheimer's worsens, people experience greater memory loss and other cognitive difficulties. Problems can include [wandering](#) and getting lost, trouble handling money and paying bills, repeating questions, taking longer to complete normal daily tasks, and [personality and behavior changes](#). People are often diagnosed in this stage.

### **Moderate Alzheimer's disease**

In this stage, damage occurs in areas of the brain that control language, reasoning, conscious thought, and sensory processing, such as the ability to correctly detect sounds and smells. Memory loss and confusion grow worse, and people begin to have problems recognizing family and friends. They may be unable to learn new things, carry out multistep tasks such as getting dressed, or cope with new situations. In addition, people at this stage may have [hallucinations, delusions, and paranoia](#) and may behave impulsively.

### **Severe Alzheimer's disease**

Ultimately, plaques and tangles spread throughout the brain, and brain tissue shrinks significantly. People with severe Alzheimer's cannot communicate and are completely dependent on others for their care. Near the end of life, the person may be in bed most or all of the time as the body shuts down.

## **What causes Alzheimer's disease?**

In recent years, scientists have made tremendous progress in better understanding Alzheimer's and the momentum continues to grow. Still, scientists don't yet fully understand [what causes Alzheimer's disease](#) in most people. The causes probably include a combination of age-related changes in the brain, along with genetic, environmental, and lifestyle factors. The importance of any one of these factors in increasing or decreasing the risk of developing Alzheimer's may differ from person to person.

## **The basics of Alzheimer's disease**

Scientists are conducting studies to learn more about plaques, tangles, and other biological features of Alzheimer's. Advances in brain imaging techniques enable researchers to see the development and spread of abnormal amyloid and tau proteins in the living brain, as well as changes in brain structure and function. Scientists are also exploring the very earliest steps in the disease process by studying changes in the brain and body fluids that can be detected years before Alzheimer's symptoms appear. Findings from these studies will help improve our understanding of the causes of Alzheimer's and make diagnosis easier.

One of the great mysteries of Alzheimer's is why it largely affects older adults. Research on normal brain aging is exploring this question. For example, scientists are learning how age-related changes in the brain may harm neurons and affect other types of brain cells to contribute to Alzheimer's damage. These age-related changes include atrophy (shrinking) of certain parts of the brain, inflammation, blood vessel damage, production of unstable molecules called free radicals, and mitochondrial dysfunction (a breakdown of energy production within a cell).

> View the [Alzheimer's & the Brain Video](#)

## **Alzheimer's disease genetics**

In most cases, Alzheimer's does not have a single genetic cause. Instead, it is likely influenced by multiple genes in combination with lifestyle and environmental factors. Changes in genes, called genetic variations, may increase or decrease a person's risk of developing the disease.

Scientists currently know of more than 80 genetic regions associated with Alzheimer's. Of the genetic variants associated with Alzheimer's so far, only three are known to cause the disease. Although it happens rarely, when someone inherits an altered version of one of these genes — *APP*, *PSEN1*, or *PSEN2* — they will likely develop Alzheimer's before age 65 and sometimes much earlier.

People with Down syndrome also have a higher risk of developing Alzheimer's earlier in life. Down syndrome results from having an extra chromosome 21, which carries the *APP* gene that produces the amyloid precursor protein. Too much of this protein leads to build-up of beta-amyloid plaques in the brain. Estimates suggest that 50% or more of people living with Down syndrome will develop Alzheimer's with

symptoms appearing in their 50s and 60s.

Another genetic variation, in the *APOE* gene, which has several forms, is known to influence the risk of Alzheimer's. Specifically, *APOE*  $\epsilon 4$  increases a person's risk of developing Alzheimer's and is also associated with developing Alzheimer's earlier in life for certain populations. *APOE*  $\epsilon 2$  may provide some protection against Alzheimer's.

Changes in different genes, along with other biomedical, lifestyle, and environmental factors, play a role in potentially developing Alzheimer's. Still, it is never known for certain if any individual will or will not develop the disease.

> For more about Alzheimer's genetics research, see NIA's [Alzheimer's Disease Genetics Fact Sheet](#).

### **Health, environmental, and lifestyle factors**

Research suggests that a host of factors beyond genetics may play a role in the development and course of Alzheimer's. There is a great deal of interest, for example, in the relationship between cognitive decline and vascular conditions, such as heart disease, stroke, and high blood pressure, as well as metabolic diseases, such as diabetes and obesity. Ongoing research will help us understand whether and how [reducing risk factors](#) for these conditions may also reduce the risk of Alzheimer's.

A nutritious diet, physical activity, [social engagement](#), and mentally stimulating pursuits have all been associated with helping people stay healthy as they age. These factors might also help reduce the risk of cognitive decline and Alzheimer's. Researchers are testing some of these possibilities in clinical trials.

### **How is Alzheimer's disease diagnosed?**

Doctors use several methods and tools to help determine whether a person who is having memory problems has Alzheimer's.

To diagnose Alzheimer's, doctors may:

- Ask the person and a family member or friend questions about overall health, use of prescription and over-the-counter medicines, diet, 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.
- Order blood, urine, and other standard medical tests to help identify other possible causes of the problem.
- Administer tests to determine if depression or another mental health condition is causing or contributing to a person's symptoms.
- Collect cerebrospinal fluid via a spinal tap or order blood tests to measure the levels of proteins associated with Alzheimer's and related dementias.
- Perform brain scans, such as CT, MRI, or PET (positron emission tomography), to support an Alzheimer's diagnosis or to rule out other possible causes for symptoms.

These tests may be repeated to give doctors information about how the person's memory and other cognitive functions are changing over time.

People with memory and thinking concerns should talk to their doctor to find out whether their symptoms are due to Alzheimer's or to another cause, such as stroke, tumor, [Parkinson's disease](#), sleep disturbances, side effects of medication, an infection, or [another type of dementia](#). Some of these conditions may be treatable and, possibly, reversible.

If the diagnosis is Alzheimer's, beginning treatment as early as possible in the disease process may help preserve daily functioning for a while. An early diagnosis also helps families plan for the future. They can take care of financial and legal matters, address potential [safety issues](#), learn about living arrangements, and develop support networks.

In addition, an early diagnosis provides people with more opportunities to participate in clinical trials or studies testing possible new treatments for Alzheimer's.

> For more information, visit [How Is Alzheimer's Disease Diagnosed?](#)

### **How is Alzheimer's disease treated?**

Alzheimer's is complex, and it is therefore unlikely that any one drug or other intervention will successfully treat it in all people living with the disease. In ongoing clinical trials, scientists are developing and testing several possible treatment interventions.

While there is currently no cure for Alzheimer's, medications are emerging to treat the progression of the disease by targeting its underlying causes. There are also medications that may temporarily improve or stabilize memory and thinking skills in some people and may help manage certain symptoms and behavioral problems.

Additionally, people with Alzheimer's also may experience [sleeplessness](#), depression, anxiety, [agitation](#), and other behavioral and psychological symptoms. Scientists continue to research why these symptoms occur and are exploring new medications and non-drug strategies to manage them. Research shows that treating these symptoms may make people with Alzheimer's feel more comfortable and also help their caregivers. Antidepressants, antipsychotics, and anti-anxiety drugs may be helpful for some people with Alzheimer's, but experts agree that these medicines should be used only after other strategies to promote physical and emotional comfort, such as avoiding stressful situations, have been tried. It's important to talk with a doctor about what treatment will be most effective in your situation.

> For more information, visit [How Is Alzheimer's Disease Treated?](#)

### **Clinical trials on Alzheimer's disease treatments**

Volunteers are needed for clinical trials that are testing ways to treat Alzheimer's. By joining one of these studies, you may help scientists discover new Alzheimer's treatments and contribute useful information to help people living with Alzheimer's disease.

> Find [clinical trials near you](#)

### **Support for families and Alzheimer's disease caregivers**

Caring for a person with Alzheimer's can have significant physical, emotional, and financial costs. The demands of day-to-day care, changes in family roles, and decisions about placement in a care facility can be difficult. NIA supports efforts to evaluate programs, strategies, approaches, and other research to improve the quality of care and life for those living with dementia and their caregivers.

Becoming well-informed about the disease is one important long-term strategy. Programs that teach families about the various stages of Alzheimer's and about ways to deal with difficult behaviors and other caregiving challenges can help.

Good coping skills, a strong support network, and respite care are other things that may help caregivers handle the stress of caring for a loved one with Alzheimer's. For example, staying physically active provides physical and emotional benefits.

Some caregivers have found that joining a support group is a critical lifeline. These support groups enable caregivers to find respite, express concerns, share experiences, get tips, and receive emotional comfort. Many organizations sponsor in-person and online support groups, including groups for people with early-stage Alzheimer's and their families.

> For more information, see [Alzheimer's Caregiving](#).

### **For more information about Alzheimer's disease**

#### **NIA Alzheimer's and related Dementias Education and Referral (ADEAR) Center**

800-438-4380

[www.nia.nih.gov/alzheimers](http://www.nia.nih.gov/alzheimers)

The NIA ADEAR Center offers information and free print publications about Alzheimer's and related dementias for families, caregivers, and health professionals. ADEAR Center staff answer telephone, email, and written requests and make referrals to local and national resources.

#### **Alzheimers.gov**

[www.alzheimers.gov](http://www.alzheimers.gov)

Explore the Alzheimers.gov website for information and resources on Alzheimer's and related dementias from across the federal government.

#### **Eldercare Locator**

800-677-1116

<https://eldercare.acl.gov>

#### **MedlinePlus**

National Library of Medicine

[www.medlineplus.gov](http://www.medlineplus.gov)

#### **Alzheimer's Association**

800-272-3900

866-403-3073 (TTY)



[www.alz.org](http://www.alz.org)

**Alzheimer's Foundation of America**

866-232-8484

[www.alzfdn.org](http://www.alzfdn.org)

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