

Alzheimer's Disease

Ref.: <https://www.radiologyinfo.org/en/info/alzheimers>

Alzheimer's disease is a condition where neurons within the brain stop functioning, lose connection with other neurons and die. It's the most common cause of dementia, a loss of brain function that can adversely impact memory, thinking, language, judgment and behavior. Alzheimer's is irreversible and progressive.

Alzheimer's is evaluated by identifying certain symptoms and ruling out other possible causes of dementia. Your doctor will likely perform a complete medical exam, including neurological, blood and brain imaging exams, such as CT, MRI or PET/CT of the head. There is no cure for Alzheimer's disease. However, your doctor may prescribe medication to slow the disease's progression and manage your symptoms.

What is Alzheimer's disease?

Alzheimer's disease is the most common cause of dementia, a loss of brain function that affects memory, thinking, language, judgment and behavior. In Alzheimer's disease, large numbers of **neurons** stop functioning, lose connections with other neurons, and die.

Irreversible and progressive, Alzheimer's disease slowly destroys memory and thinking skills and, eventually, the ability to carry out the simplest tasks of daily living.

Although the cause of Alzheimer's disease is unknown, scientists believe that a build-up of **beta-amyloid plaques** and **neurofibrillary tangles** in the brain are associated with the disease.

The stages of the disease typically progress from mild to moderate to severe. Symptoms usually develop slowly and gradually worsen over a number of years; however, progression and symptoms vary from person to person. The first symptom of Alzheimer's disease usually appears as forgetfulness.

Mild cognitive impairment (MCI) is a stage between normal forgetfulness due to aging and the development of Alzheimer's disease. People with MCI have mild

problems with thinking and memory that do not interfere with everyday activities. Not everyone with MCI develops Alzheimer's disease.

Other early symptoms of Alzheimer's include language problems, difficulty performing tasks that require thought, personality changes and loss of social skills.

As Alzheimer's disease progresses, symptoms may include a change in sleep patterns, depression, agitation, difficulty doing basic tasks such as reading or writing, violent behavior and poor judgment.

People with severe Alzheimer's disease are unable to recognize family members or understand language.

How is Alzheimer's disease diagnosed and evaluated?

No single test can determine whether a person has Alzheimer's disease. A diagnosis is made by determining the presence of certain symptoms and ruling out other causes of dementia. This involves a careful medical evaluation, including a thorough medical history, mental status testing, a physical and neurological exam, blood tests and brain imaging exams, including:

- ***CT imaging of the head:*** Computed tomography (CT) scanning combines special x-ray equipment with sophisticated computers to produce multiple images or pictures of the inside of the body. Physicians use a CT of the brain to look for and rule out other causes of dementia, such as a brain tumor, subdural hematoma or stroke.
- ***MRI of the head:*** Magnetic resonance imaging (MRI) uses a powerful magnetic field, radio frequency pulses and a computer to produce detailed pictures of organs, soft tissues, bone and virtually all other internal body structures. MRI can detect brain abnormalities associated with mild cognitive impairment (MCI) and can be used to predict which patients with MCI may eventually develop Alzheimer's disease. In the early stages of Alzheimer's disease, an MRI scan of the brain may be normal. In later stages, MRI may show a decrease in the size of different areas of the brain (mainly affecting the temporal and parietal lobes).
- ***PET and PET/CT of the head:*** A positron emission tomography (PET) scan is a diagnostic examination that uses small amounts of **radioactive** material

(called a **radiotracer**) to diagnose and determine the severity of a variety of diseases.

A combined PET/CT exam fuses images from a PET and CT scan together to provide detail on both the anatomy (from the CT scan) and function (from the PET scan) of organs and tissues. A PET/CT scan can help differentiate Alzheimer's disease from other types of dementia. Another nuclear medicine test called a **single-photon emission computed tomography** (SPECT) scan is also used for this purpose.

- Using PET scanning and a new radiotracer called **C-11 PIB**, scientists have recently imaged the build-up of beta-amyloid plaques in the living brain. Radiotracers similar to C-11 PIB are currently being developed for use in the clinical setting.

How is Alzheimer's disease treated?

There is no cure for Alzheimer's disease. However, medications that slow the progression of the disease and manage symptoms are available.