Alzheimer's Disease

Fact Sheet

Dementia is a brain disorder that seriously affects a person's ability to carry out daily activities. The most common form of dementia among older people is Alzheimer's disease (AD), which initially involves the parts of the brain that control thought, memory, and language. Although scientists are learning more every day, right now they still do not know what causes AD, and there is no cure.

Scientists think that as many as 4.5 million Americans suffer from AD. The disease usually begins after age 60, and risk goes up with age. While younger people also may get AD, it is much less common. About 5 percent of men and women ages 65 to 74 have AD, and nearly half of those age 85 and older may have the disease. It is important to note, however, that AD is not a normal part of aging.

Alzheimer's Disease Education & Referral (ADEAR) Center
A Service of the
National Institute on Aging
National Institutes of Health
U.S. Department of Health and Human Services

AD is named after Dr. Alois Alzheimer, a German doctor. In 1906, Dr. Alzheimer noticed changes in the brain tissue of a woman who had died of an unusual mental illness. He found abnormal clumps (now called amyloid plaques) and tangled bundles of fibers (now called neurofibrillary tangles). Today, these plaques and tangles in the brain are considered signs of AD.

Scientists also have found other brain changes in people with AD. Nerve cells die in areas of the brain that are vital to memory and other mental abilities, and connections between nerve cells are disrupted. There also are lower levels of some of the chemicals in the brain that carry messages back and forth between nerve cells. AD may impair thinking and memory by disrupting these messages.

What Causes AD?

Scientists do not yet fully understand what causes AD. There probably is not one single cause, but several factors

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that affect each person differently. Age is the most important known risk factor for AD. The number of people with the disease doubles every 5 years beyond age 65.

Family history is another risk factor. Scientists believe that genetics may play a role in many AD cases. For example, early-onset familial AD, a rare form of AD that usually occurs between the ages of 30 and 60, is inherited. The more common form of AD is known as late-onset. It occurs later in life, and no obvious inheritance pattern is seen in most families. However, several risk factor genes may interact with each other and with non-genetic factors to cause the disease. The only risk factor gene identified so far for late-onset AD is a gene that makes one form of a protein called apolipoprotein E (ApoE). Everyone has ApoE, which helps carry cholesterol in the blood. Only about 15 percent of people have the form that increases the risk of AD. It is likely that other genes also may increase the risk of AD or protect against AD, but they remain to be discovered.

Scientists still need to learn a lot

more about what causes AD. In addition to genetics and ApoE, they are studying education, diet, and environment to learn what role they might play in the development of this disease. Scientists are finding increasing evidence that some of the risk factors for heart disease and stroke, such as high blood pressure, high cholesterol, and low levels of the vitamin folate, may also increase the risk of AD. Evidence for physical, mental, and social activities as protective factors against AD is also increasing.

What Are the Symptoms of AD?

AD begins slowly. At first, the only symptom may be mild forgetfulness, which can be confused with age-related memory change. Most people with mild forgetfulness do not have AD. In the early stage of AD, people may have trouble remembering recent events, activities, or the names of familiar people or things. They may not be able to solve simple math problems. Such difficulties may be a bother, but usually they are not serious enough to cause alarm.

However, as the disease goes on, symptoms are more easily noticed and become serious enough to cause people with AD or their family members to seek medical help. Forgetfulness begins to interfere with daily activities. People in the middle stages of AD may forget how to do simple tasks like brushing their teeth or combing their hair. They can no longer think clearly. They can fail to recognize familiar people and places. They begin to have problems speaking, understanding, reading, or writing. Later on, people with AD may become anxious or aggressive, or wander away from home. Eventually, patients need total care.

How is AD Diagnosed?

An early, accurate diagnosis of AD helps patients and their families plan for the future. It gives them time to discuss care while the patient can still take part in making decisions. Early diagnosis will also offer the best chance to treat the symptoms of the disease.

Today, the only definite way to diagnose AD is to find out whether

there are plaques and tangles in brain tissue. To look at brain tissue, however, doctors usually must wait until they do an autopsy, which is an examination of the body done after a person dies. Therefore, doctors can only make a diagnosis of "possible" or "probable" AD while the person is still alive.

At specialized centers, doctors can diagnose AD correctly up to 90 percent of the time. Doctors use several tools to diagnose "probable" AD, including:

- questions about the person's general health, past medical problems, and ability to carry out daily activities,
- tests of memory, problem solving, attention, counting, and language,
- medical tests—such as tests of blood, urine, or spinal fluid, and
- brain scans.

Sometimes these test results help the doctor find other possible causes of the person's symptoms. For example, thyroid problems, drug reactions, depression, brain tumors, and blood vessel disease in the brain can cause AD-like symptoms. Some of these other conditions can be treated successfully.

How is AD Treated?

AD is a slow disease, starting with mild memory problems and ending with severe brain damage. The course the disease takes and how fast changes occur vary from person to person. On average, AD patients live from 8 to 10 years after they are diagnosed, though some people may live with AD for as many as 20 years.

No treatment can stop AD. However, for some people in the early and middle stages of the disease, the drugs tacrine (Cognex), donepezil (Aricept), rivastigmine (Exelon), or galantamine (Razadyne, previously known as Reminyl) may help prevent some symptoms from becoming worse for a limited time. Another drug, memantine (Namenda), has been approved to treat moderate to severe AD, although it also is limited in its effects. Also, some medicines may help control behavioral symptoms of AD such as sleeplessness, agitation, wandering, anxiety, and depression. Treating these symptoms often makes patients more comfortable and makes their care easier for caregivers.

New Areas of Research

The National Institute on Aging (NIA), part of the National Institutes of Health (NIH), is the lead Federal agency for AD research. NIA-supported scientists are testing a number of drugs to see if they prevent AD, slow the disease, or help reduce symptoms. Some ideas that seem promising turn out to have little or no benefit when they are carefully studied in a clinical trial. Researchers undertake clinical trials to learn whether treatments that appear promising in observational and animal studies actually are safe and effective in people.

Mild Cognitive Impairment. During the past several years, scientists have focused on a type of memory change called mild cognitive impairment (MCI), which is different from both AD and normal age-related memory change. People with MCI have ongoing memory problems, but they do not have other losses such as confusion, attention problems, and difficulty with language. The NIA-funded Memory Impairment Study compared donepezil (Aricept), vitamin E, or placebo in participants with

MCI to see whether the drugs might delay or prevent progression to AD. The study found that the group with MCI taking the drug donepezil were at reduced risk of progressing to AD for the first 18 months of a 3-year study when compared with their counterparts on placebo. The reduced risk of progressing from MCI to a diagnosis of AD among participants on donepezil disappeared after 18 months, and by the end of the study, the probability of progressing to AD was the same in the two groups. Vitamin E had no effect at any time point in the study when compared with placebo.

Neuroimaging. Scientists are finding that damage to parts of the brain involved in memory, such as the hippocampus, can sometimes be seen on brain scans before symptoms of the disease occur. An NIA public-private partnership—the AD Neuroimaging Initiative (ADNI)—is a large study that will determine whether magnetic resonance imaging (MRI) and positron emission tomography (PET) scans, or other imaging or biological markers, can see early AD changes or measure disease progression. The

project is designed to help speed clinical trials and find new ways to determine the effectiveness of treatments. For more information on ADNI, call the NIA's Alzheimer's Disease Education and Referral (ADEAR) Center at 1-800-438-4380, or visit *www.alzheimers.org*.

AD Genetics. The NIA is sponsoring the AD Genetics Study to learn more about risk factor genes for late onset AD. To participate in this study, families with two or more living siblings diagnosed with AD should contact the National Cell Repository for AD toll-free at 1-800-526-2839. Information may also be requested through the study's website: *http://ncrad.iu.edu*.

Inflammation. There is evidence that inflammation in the brain may contribute to AD damage. Some studies have suggested that drugs such as nonsteroidal anti-inflammatory drugs (NSAIDs) might help slow the progression of AD, but clinical trials thus far have not demonstrated a benefit from these drugs. A clinical trial studying two of these drugs, rofecoxib (Vioxx) and naproxen (Aleve) showed that they did not delay

the progression of AD in people who already have the disease. Another trial, testing whether the NSAIDs celecoxib (Celebrex) and naproxen could prevent AD in healthy older people at risk of the disease, has been suspended. However, investigators are continuing to follow the participants and are examining data regarding possible cardiovascular risk. Researchers are continuing to look for ways to test how other anti-inflammatory drugs might affect the development or progression of AD.

Antioxidants. Several years ago, a clinical trial showed that vitamin E slowed the progress of some consequences of AD by about 7 months. Additional studies are investigating whether antioxidants—vitamins E and C—can slow AD. Another clinical trial is examining whether vitamin E and/or selenium supplements can prevent AD or cognitive decline, and additional studies on other antioxidants are ongoing or being planned.

Ginkgo biloba. Early studies suggested that extracts from the leaves of the *ginkgo biloba* tree may be of some help in treating AD symptoms.

There is no evidence yet that *ginkgo biloba* will cure or prevent AD, but scientists now are trying to find out in a clinical trial whether *ginkgo biloba* can delay cognitive decline or prevent dementia in older people.

Estrogen. Some studies have suggested that estrogen used by women to treat the symptoms of menopause also protects the brain. Experts also wondered whether using estrogen could reduce the risk of AD or slow the disease. Clinical trials to test estrogen, however, have not shown that estrogen can slow the progression of already diagnosed AD. And one study found that women over the age of 65 who used estrogen with a progestin were at greater risk of dementia, including AD, and that older women using only estrogen could also increase their chance of developing dementia.

Scientists believe that more research is needed to find out if estrogen may play some role in AD. They would like to know whether starting estrogen therapy around the time of menopause, rather than at age 65 or older, will protect memory or prevent AD.

Participating in Clinical Trials

People with AD, those with MCI, or those with a family history of AD, who want to help scientists test possible treatments may be able to take part in clinical trials. Healthy people also can help scientists learn more about the brain and AD. The NIA maintains the AD Clinical Trials Database, which lists AD clinical trials sponsored by the Federal government and private companies. To find out more about these studies, contact the NIA's ADEAR Center at 1-800-438-4380 or visit the ADEAR Center website at *www.alzheimers.org/trials/index.html*. You also can sign up for e-mail alerts on new clinical trials as they are added to the database. Additional clinical trials information is available at *www.clinicaltrials.gov*.

Many of these studies are being done at NIA-supported Alzheimer's Disease Centers located throughout the United States. These centers carry out a wide range of research, including studies of the causes, diagnosis, treatment, and management of AD. To get a list of these centers, contact the ADEAR Center.

Advancing our Understanding

Scientists have come a long way in their understanding of AD. Findings from years of research have begun to clarify differences between normal age-related memory changes, MCI, and AD. Scientists also have made great progress in defining the changes that take place in the AD brain, which allows them to pinpoint possible targets for treatment.

These advances are the foundation for the NIH Alzheimer's Disease Prevention Initiative, which is designed to:

- understand why AD occurs and who is at greatest risk of developing it;
- improve the accuracy of diagnosis and the ability to identify those at risk;
- discover, develop, and test new treatments;
- discover treatments for behavioral problems in patients with AD.

Is There Help for Caregivers?

Most often, spouses and other family members provide the day-to-day care for people with AD. As the disease gets worse, people often need more

and more care. This can be hard for caregivers and can affect their physical and mental health, family life, job, and finances.

The Alzheimer's Association has chapters nationwide that provide educational programs and support groups for caregivers and family members of people with AD. Contact information for the Alzheimer's Association is listed at the end of this fact sheet.

For More Information

To learn about support groups, services, research centers, getting involved in studies, and publications about AD, contact the following:

Alzheimer's Disease Education and Referral (ADEAR) Center
P.O. Box 8250
Silver Spring, MD 20907-8250
1-800-438-4380
www.alzheimers.org
This service of the NIA is funded by the Federal Government. It offers information and publications on diagnosis, treatment, patient care, caregiver needs, long-term care, education and training, and research related to AD.

Staff answer telephone, e-mail, and written requests and make referrals to local and national resources.

Alzheimer's Association
225 N. Michigan Avenue, Suite 1700
Chicago, IL 60611-7633
1-800-272-3900
www.alz.org
This nonprofit association supports families and caregivers of patients with AD. Chapters nationwide provide referrals to local resources and services, and sponsor support groups and educational programs. The Association also funds research.

Eldercare Locator
800-677-1116
www.eldercare.gov
This service of the Administration on Aging is funded by the Federal Government. It offers information about and referrals to respite care and other home and community services offered by State and Area Agencies on Aging.

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