**Early Identification of Alzheimer's Disease and Related Dementias**

**NYSNA Continuing Education**

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**How to Take This Course**

Please take a look at the steps below; these will help you to progress through the course material, complete the course examination and receive your certificate of completion.

1. **REVIEW THE OBJECTIVES**

   The objectives provide an overview of the entire course and identify what information will be focused on. Objectives are stated in terms of what you, the learner, will know or be able to do upon successful completion of the course. They let you know what you should expect to learn by taking a particular course and can help focus your study.

2. **STUDY EACH SECTION IN ORDER**

   Keep your learning "programmed" by reviewing the materials in order. This will help you understand the sections that follow.

3. **COMPLETE THE COURSE EXAM**

   After studying the course, click on the "Course Exam" option located on the course navigation toolbar. Answer each question by clicking on the button corresponding to the correct answer. All questions must be answered before the test can be graded; there is only one correct answer per question. You may refer back to the course material by minimizing the course exam window.

4. **GRADE THE TEST**

   Next, click on "Submit Test." You will know immediately whether you passed or failed. If you do not successfully complete the exam on the first attempt, you may take the exam again. If you do not pass the exam on your second attempt, you will need to purchase the course again.

5. **FILL OUT THE EVALUATION FORM**

   Upon passing the course exam you will be prompted to complete a course evaluation. You will have access to the certificate of completion **after you complete the evaluation**. At this point, you should print the certificate and keep it for your records.

**Course Objectives**

At the completion of this learning activity the learner will be able to:

- Describe the physiology of Alzheimer's Disease as it is understood today.
- Identify triggers that indicate the need for an assessment for dementia.
- Discuss risk factors for Alzheimer's disease.
- Explain components of a basic dementia assessment.
- List medications that can cause symptoms of dementia.
- Discuss the relationships/differences between and among dementia, delirium and depression.
- Identify assessment instruments that can be helpful in determining dementia.
- Explain the importance of early identification of Alzheimer's disease and the relationship to patient education.
- Discuss treatment options.
- Identify resources available for patients and families affected by Alzheimer's disease.

**Introduction**

Dementia is a syndrome of progressive decline that relentlessly erodes intellectual abilities, causing cognitive and functional deterioration leading to impairment of social and occupational functioning. Because Alzheimer's disease is the most common dementing illness in the United States, it is used as a prototype for dementia in this course unless otherwise stated.

An estimated 5 to 10 percent of the U.S. adult population age 65 and older is affected by a dementing disorder, and incidence doubles every 5 years after age 65. Currently over 4.5 million Americans suffer from dementing illness. The older population in the United States is increasing dramatically. As of the year 2000, an estimated 35 million people were age 65 and older. Researchers estimate that by 2050, 70 million Americans will be age 65 or older, accounting for 1 in 5 Americans. More than 19 million Americans will be age 85 and older (ADEAR, 2005; NIA, NIH & DHHS, 2003).

Despite its prevalence, dementia is often unrecognized or misdiagnosed in its early stages. Many healthcare professionals, as well as patients, their families and friends, mistakenly view the early symptoms of dementia as inevitable consequences of aging. Failure to identify early stage dementia can result in inappropriate treatment, hazardous situations, and needless distress. Early recognition of dementia, however, not only can prevent problems but also can allow the patient and family to plan for the future and consider participation in trials of promising new therapies as they are developed.

A number of characteristics distinguish early-stage dementia from normal aging and from other syndromes that involve cognitive problems, including depression. Certain triggers (clues, symptoms) should prompt a clinician to conduct an initial assessment of mental and functional status to rule out dementia rather than attribute it to apparent signs of decline due to aging. Although the patient, family members, or others often bring their concerns about symptoms to the clinician's attention, clinicians also should be alert to such signs during office visits, hospitalization and any other contact with patients. In asymptomatic persons who have possible risk factors the clinician's judgment and knowledge of the patient's current condition, history, and social situation (living arrangements, support services, isolation) must guide the decision to initiate an assessment for dementia

All dementias are not Alzheimer's disease and differentiation of depression, delirium or reversible causes of dementia is essential. Early diagnosis is vital and may result in reversal of some conditions, lessening of symptoms in others or the opportunity to prepare one's self and family.

The earlier that Alzheimer's Disease is recognized and diagnosed, the greater the gain in managing symptoms and developing a plan of care and treatment. An early, accurate diagnosis of AD is especially important to patients and their families because it helps them plan for the future and pursue care options while the patient can still take part in making decisions.

This course provides information to help nurses and other clinicians recognize those characteristics as symptoms suggestive of a dementing disorder to conduct an initial assessment of mental and functional status. The recommendations are intended for use by primary care clinicians, including but not limited to family physicians, internists, geriatricians, psychologists, psychiatrists, nurses, and nurse practitioners. Registered nurses need to know how to do a complete and thorough assessment of patients and identify dementia so that they can assist in treatment planning, care, and patient education.

**About the Author**

This course was developed by the New York State Nurses Association and is largely based on the two documents listed below, which are in the public domain. The information has been updated and expanded through the addition of current research findings and clinical information.

Costa P.T. Jr., Williams T.F., Somerfield M. et al., Early Identification of Alzheimer's Disease and Related Dementias. Clinical Practice Guideline, Quick Reference Guide for Clinicians, No.19. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research. AHCPR Publication No.97-0703. November 1996.

National Institute on Aging and National Institutes of Health (2003). *Progress Report on Alzheimer's Disease: Research and Advances at NIH.* Alzheimer's Disease Education and Referral (ADEAR) Center. Accessed at http://www.nia.nih.gov/NR/rdonlyres/0C3612EF-3C01-44EA-899B-223909A6DEEE/0/2003_Progress_Report_on_AD.pdf.

**Definitions**

Terms commonly associated with AD and dementia are complicated and are defined by the Alzheimer's Disease Education and Referral Center, a service of the National Institute on Aging (ADEAR, 2005a).

**Acetylcholine** - a neurotransmitter that plays an important role in learning and memory.

**Amyloid precursor protein (APP)** - the larger protein from which beta-amyloid is formed.

**Amyloid plaques** - largely insoluble deposits found in the spaces between nerve cells in the brain that are made of beta-amyloid, other molecules, and different kinds of nerve and non-nerve cells.

**Apolipoprotein E** - a protein that carries cholesterol in blood and that appears to play some role in brain function. The gene that produces ApoE comes in several forms, or alleles - e2, e3, and e4. The APOE e2 allele is relatively rare and may provide some protection against AD. APOE e3 is the most common allele and it appears to play a neutral role in AD. APOE e4 occurs in about 40 percent of all AD patients who develop the disease in later life; it increases the risk of developing AD.

**Axon** - the long, tube-like part of a neuron that transmits outgoing signals to other cells.

**Beta-amyloid** - a part of the APP protein found in the insoluble deposits outside neurons and that forms the core of plaques.

**Brain stem** - the part of the brain that connects the brain to the spinal cord and that controls automatic body functions, such as breathing, heart rate, and blood pressure.

**Cerebellum** - the part of the brain that is responsible for maintaining the body's balance and coordination.

**Cerebral cortex** - the outer layer of nerve cells surrounding the cerebral hemispheres.

**Cerebral hemispheres** - the largest portion of the brain, composed of billions of nerve cells in two structures connected by the corpus callosum; the cerebral hemispheres control conscious thought, language, decision making, emotions, movement, and sensory functions.

**Chromosome** - a threadlike structure in the nucleus of a cell that contains DNA, sequences of which make up genes; most human cells contain 23 pairs of chromosomes.

**Clinical trial** - a research study involving humans that rigorously tests how well an intervention works.

**Cognitive functions** - all aspects of conscious thought and mental activity, including learning, perceiving, making decisions, and remembering.

**Corpus callosum** - the thick bundle of nerves that connects the two hemispheres of the cerebral hemispheres.

**Dementia** - a broad term referring to the symptoms associated with a decline in cognitive function to the extent that it interferes with daily life and activities.

**Dendrite** - the branchlike extension of neurons that receive messages from other neurons.

**DNA (deoxyribonucleic acid)** - a long double stranded molecule within the nucleus of the cell that forms the chromosomes and contains the genes.

**Early-onset Alzheimer's disease** - a rare form of AD that usually begins to affect people between ages 30 and 60; it is called familial AD (FAD) if it runs in the family.

**Entorhinal cortex** - an area deep within the brain where damage from AD first begins.

**Enzyme** - a substance that causes or speeds up a chemical reaction.

**Free radical** - a highly reactive oxygen molecule that combines easily with other molecules, sometimes causing damage to cells.

**Gene** - the biologic unit of heredity passed from parent to child; genes are segments of DNA and they contain instructions that tell a cell how to make specific proteins.

**Genetic risk factor** - a change in a cell's DNA that does not cause a disease but may increase the chance that a person will develop a disease.

**Glial cell** - a specialized cell that supports, protects, or nourishes nerve cells.

**Hippocampus** - a structure in the brain that plays a major role in learning and memory and is involved in converting short-term to long-term memory.

**Hypothalamus** - a structure in the brain under the thalamus that monitors activities such as body temperature and food intake.

**Late-onset Alzheimer's disease** - the most common form of AD. It occurs in people aged 65 and older.

**Limbic system** - a brain region that links the brain stem with the higher reasoning elements of the cerebral cortex; it controls emotions, instinctive behavior, and the sense of smell.

**Magnetic resonance imaging (MRI)** - a diagnostic and research technique that uses magnetic fields to generate a computer image of internal structures in the body; MRIs are very clear and are particularly good for imaging the brain and soft tissues.

**Metabolism** - all the chemical processes that take place inside the body. In some metabolic reactions, complex molecules are broken down to release energy; in others, the cells use energy to make complex compounds out of simpler ones (like making proteins from amino acids).

**Microtubules** - the internal support structure for neurons that guides nutrients and molecules from the body of the cell to the end of the axon and back.

**Mutation** - a rare change in a cell's DNA that can cause a disease.

**Nerve growth factor (NGF)** - a substance that maintains the health of nerve cells. NGF also promotes the growth of axons and dendrites, the parts of the nerve cell that are essential to its ability to communicate with other nerve cells.

**Neurofibrillary tangles** - collections of twisted tau found in the cell bodies of neurons in AD.

**Neuron** - a nerve cell in the brain.

**Neurotransmitter** - a chemical messenger between neurons; a substance that is released by the axon on one neuron and excites or inhibits activity in a neighboring neuron.

**Nucleus** - the organ within a cell that contains the chromosomes and controls many of its activities.

**Positron emission tomography (PET)** - an imaging technique that allows researchers to observe and measure activity in different parts of the brain by monitoring blood flow and concentrations of substances such as oxygen and glucose in brain tissues.

**Single photon emission computerized tomography (SPECT)** - an imaging technique that allows researchers to monitor blood flow to different parts of the brain.

**Synapse** - the tiny gap between nerve cells across which neurotransmitters pass.

***Tau*** - a protein that is a principal component of the paired helical filaments in neurofibrillary tangles; *tau* helps to maintain the structure of microtubules in normal nerve cells.

**Thalamus** - a small organ in the front of the cerebral hemispheres that sends sensory information to the cerebral cortex and sends other information back to the body.

**Transgenic mice** - mice that have had a human gene (like APP) inserted into their chromosomes. Mice carrying the mutated human APP gene often develop plaques in their brains as they age.

**Ventricle** - cavity within the brain that contains cerebrospinal fluid. During AD, brain tissue shrinks and the ventricles enlarge.

**What is Alzheimer's Disease?**

Once considered a rare disorder, Alzheimer's disease is now seen as a major public health problem because of its impact on millions of older Americans and their families. Research into AD has grown dramatically as a result. Thousands of scientists in laboratories and institutions all over the world are working hard to unravel the secrets of AD and find ways to lessen its impact and perhaps, someday, to prevent it. The lead agency for AD research at the U.S. Government's agency for medical research – the National Institute of Health – is the National Institute on Aging (NIA, NIH & DHHS, 2003).

Alzheimer's disease (AD) is an age-related and irreversible brain disorder that develops gradually and results in memory loss, behavior and personality changes, and a decline in other cognitive abilities, such as thinking, decision-making, and language skills. These losses are related to the breakdown of the connections between certain nerve cells in the brain and the eventual death of many of these cells. AD is one of a group of disorders, termed dementias, that are characterized by cognitive and behavioral problems.

The course of this disease varies from person to person, as does the rate of decline. On average, patients with AD live for 8 to 10 years after they are diagnosed, though the disease can last for up to 20 years. AD advances progressively, from mild forgetfulness to a severe loss of mental function. In most people with AD, symptoms first appear after age 60. Although the risk of developing AD increases with age, AD and dementia symptoms are not part of normal aging. AD and other dementing disorders are caused by diseases that affect the brain.

AD is the most common form of dementia, a decline of mental acuity often combined with emotional apathy, among older people. It involves the parts of the brain that control thought, memory, and language.

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 hallmarks of AD (NIA, NIH & DHHS, 2003).

In normal aging, nerve cells in the brain are not lost in large numbers. In contrast, AD causes many nerve cells to stop functioning, lose connections with other nerve cells, and die.

At first, AD destroys neurons in parts of the brain that control memory, including the hippocampus (which helps to encode short-term memories) and related structures. As the neurons in the hippocampus decline in functioning, short-term memory fails, and often a person's ability to do easy and familiar tasks begins to decline. AD later attacks the cerebral cortex, particularly the areas responsible for language and reasoning. At that point, AD begins to take away language skills and changes a person's ability to make judgments. Personality changes also may occur. Emotional outbursts and disturbing behaviors, such as wandering and agitation, begin to occur and become more and more frequent as the disease continues its course. Eventually, many other areas of the brain are involved, all these brain regions atrophy, and the person with AD becomes bedridden, incontinent, helpless and eventually unresponsive to the external world.

Two abnormal brain structures are the hallmarks of AD: **amyloid plaques** and **neurofibrillary tangles**. Though researchers have known about the plaques and tangles for many years, recent research has revealed much about their composition, how they form, and their possible roles in the development of AD (NIA, NIH & DHHS, 2003).

Amyloid Plaques

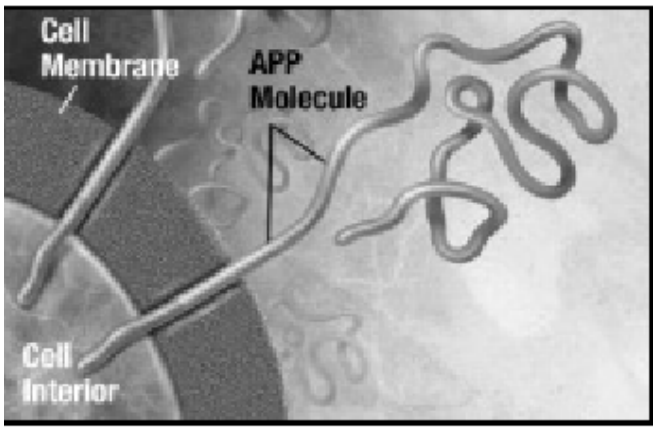
In AD, plaques develop first in areas of the brain used for memory and other cognitive functions. They consist largely of insoluble deposits of beta-amyloid, a protein fragment from a larger protein called amyloid precursor protein (APP), intermingled with a portion of neurons and with non-nerve cells such as microglia (cells that surround and digest damaged cells or foreign substances that cause inflammation) and astrocytes (glial cells that serve to support and nourish neurons). Plaques are found in the spaces between neurons of the brain.

Although researchers still do not know whether amyloid plaques themselves cause AD or whether they are a by-product of the AD process, there is evidence that amyloid deposition may be a central process in the disease. Certainly, changes in the structure of the APP protein can cause AD, as shown in one inherited form of AD, which is caused by mutations in the gene that contains instructions for making the APP protein. Recent work has revealed much about the nature of beta-amyloid and the ways in which it may be toxic to neurons, the processes by which plaques form and are deposited in the brain, and ways in which the numbers of plaques can be reduced (NIA, NIH & DHHS, 2003).

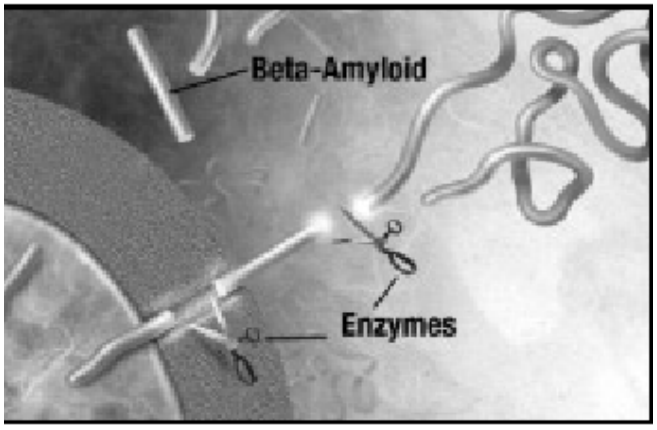
Neurofibrillary Tangles

The second hallmark of AD consists of abnormal collections of twisted threads found inside nerve cells. The chief of these tangles is one form of a protein called tau. In the central nervous system, tau proteins are best known for their ability to bind and help stabilize microtubules, which are one constituent of the cell's internal support structure, or skeleton.

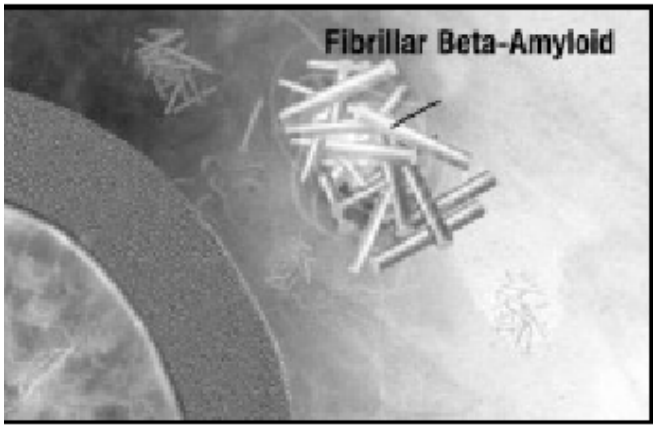
In healthy neurons, microtubules form structures similar to train tracks, which guide nutrients and molecules from the cell bodies down through the axon. Tau normally holds together the "railroad ties" or connector pieces for the microtubule tracks. However, in AD tau is changed chemically, and this altered tau twists into paired helical filaments—two threads of tau wound around each other. These filaments aggregate to form neurofibrillary tangles. When this happens, the tau no longer holds the railroad tracks together and the microtubules fall apart. This collapse of the transport system first may result in malfunctions in communication between nerve cells and later may lead to neuronal death that contributes to the development of dementia. Recent research has shed much light on this abnormal aggregation of tau protein and on the role that certain genetic mutations play in changing tau's structure and contributing to neurodegeneration (NIA, NIH & DHHS, 2003). See the photos below (NIA, NIH & DHHS, 2003) accessed at http://www.alzheimers.org/pr03/2003_Progress_Report_on_AD.pdf:



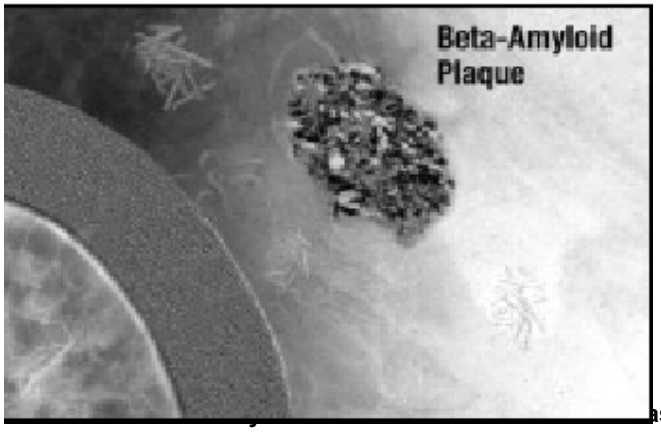

APP is associated with the cell membrane, the thin barrier that encloses the cell. After it is made, APP sticks through the neuron's membrane, partly inside and partly outside the cell.




Enzymes (substances that cause or speed up a chemical reaction) act on the APP and cut it into soluble fragments of protein, one of which is called betaamyloid.




These soluble beta-amyloid fragments begin clustering together into oligomers and then into increasingly insoluble fibrillar beta-amyloid aggregates.




Eventually, this process leads to the beta-amyloid plaques that are found in abundance outside and around neurons in the brains of people with AD.

**The Impact of AD**

AD is the most common cause of dementia among people age 65 and older. Its current and future impact on our society can be seen in these few statistics:

- Scientists estimate that around 4.5 million people now have AD.
- For every 5-year age group beyond 65, the percentage of people with AD doubles.
- By 2050, 13.2 million older Americans are expected to have AD if the current numbers hold and no preventive treatments become available.

Researchers recently projected the number of new cases of AD that could occur every year between 1995 and 2050. They estimate that the number will more than double – from 377,000 per year in 1995, to 959,000 per year in 2050. Two factors will combine to cause this increase:

- The fact that AD risk increases as people get older.
- The growing numbers of older people, especially those over 85.

The annual number of new cases will increase sharply around 2040, when all baby boomers will be over 65 (NIA, NIH & DHHS, 2003). These numbers are significant now and will become even more so in the future because of dramatic increases in life expectancy since the early 1900s. Researchers estimate that by 2050, 13.2 million Americans will have AD if current population trends continue and no preventive treatments become available (Hebert et al., 2003).

Approximately 4 million Americans are 85 years old or older, and this age group is the fastest growing segment of the population. It also is the group with the highest risk of AD. The U.S. Census Bureau estimates that nearly 19 million Americans will be aged 85 and older by the year 2050. Some experts who study population trends suggest that the number could be even greater. This trend is not only apparent in the U.S. but also worldwide.

People with AD are cared for in many settings, including home, assisted living facilities, nursing homes, and special care units of care facilities. Researchers estimate that the national cost of caring for people with the disease is about $100 billion per year (NIA, NIH & DHHS, 2003).

AD's impact is seen not only in the numbers who develop the disease and the cost to society, but also in its effects on people with the disease, their families, friends and caregivers. Slightly more than half of AD patients receive care at home, while the remainder are cared for in a variety of healthcare institutions. During their years of care giving, these spouses, relatives, and friends experience emotional, physical, and financial stress. They watch their loved ones become more and more forgetful, frustrated, and confused. Eventually, the person with AD will not even recognize his or her nearest and dearest relatives and friends.

**Cognitive Impairment in Aging**

Certain regions of the frontal cortex are less activated in older adults than in younger adults. Older adults, however, also show activation of additional and different regions in the frontal cortex. By identifying the changes that occur in the brain as it ages normally, investigators hope to be able to understand the additional pathological changes that lead to AD. These early changes are difficult to differentiate from those that occur in healthy aging. Although declining cognitive function is not the same as AD or dementia, learning about these changes is key to understanding the early stages of AD. Several teams of scientists have conducted community-based studies in which they have followed groups of older individuals for 6 to 10 years to explore patterns of cognitive decline in people with no obvious symptoms of dementia. In one of these studies, a research team from the University of Pittsburgh School of Public Health conducted Clinical and neuropsychological evaluations of a group of more than 1,400 older adults every 2 years for 10 years (Chen et al., 2001).

The study indicated that those who eventually developed dementia were significantly older and tended to have low educational levels compared to those who remained cognitively healthy. The test scores of those who did not develop dementia improved over time. In contrast, among the older adults who eventually developed dementia, a decline on the same tests during the two evaluation periods before symptoms appeared predicted the development of the symptoms.

Normal Aging

There are many myths associated with aging. According to the National Institute of Aging (NIA) (2004), normal memory changes associated with aging are characterized by momentary lapses, such as misplacing an item, forgetting someone's name, or forgetting to pick up something at the store.

While there is much variation from person to person, generally speaking, normal aging includes:

- Speed of learning decreases.
- Ability to recall decreases; more memory cues and more frequent memory cues are needed to retrieve information
- More distractible leading to decreased attention, decrease in ability to concentrate making recall more difficult.

Mild Cognitive Impairment

Mild Cognitive Impairment (MCI) is a condition with demonstrable cognitive impairments with a history and deficits that do not meet the criteria for dementia (Green, 2005). The National Institute of Aging (1999) contrasts the above memory lapses in normal aging with memory lapses associated with MCI. MCI is a more persistent and troublesome problem. People with MCI have much greater difficulty, for example, remembering a fact after a relatively short time. In cognitive testing, people with MCI, after a delay, remember significantly less of a paragraph they have read or details of simple drawings they have seen compared to people with normal memory changes associated with aging. A person with MCI is likely to forget important events repeatedly, while significant information is retained in normal aging. MCI is a condition of mild impairment, specifically in the area of memory, while dementia is characterized by additional and severe problems in other areas of cognition, such as orientation, language, and attention. While most patients with MCI get worse, not all will. AD invariably results in a gradual decline, eventually progressing to severe, debilitating dementia (NIA, 1999).

At the American Academy of Neurology (AAN), data from both neuropsychological studies and metabolic imaging support two types of MCI: **amnestic** characterized by posterior temporoparietal hypometabolism that likely evolves into AD; and a subtype characterized by milder, more diffuse or "executive" deficits with metabolic reduction in frontal regions (Green, 2005).

Researchers have been interested in MCI in part because a significant number of people over the age of 65 with MCI eventually develop AD, in some studies approximately 12-15 percent per year (or about 40 percent after three years). This is much higher than the 1 percent or so per year in a normal population of people 65 and older. As such, MCI is a risk factor for developing AD. Researchers are examining the possible relationship between the two conditions (NIA, 2004).

Petersen (1999) suggests that a diagnosis of MCI can be made on the basis of five criteria: 1) memory complaints, 2) abnormal memory for age, 3) ability to carry out normal activities of daily living, 4) normal general cognitive function, and 5) no dementia. In his research at the Mayo Clinic, scientists compared the cognitive test results of people with MCI to those of healthy people

and patients with mild AD. People with MCI typically performed worse on the memory measures than healthy people, but scored roughly the same as patients with AD.

However, on other cognitive tests, measuring a person's disorientation and confusion about routine activities, MCI individuals' scores were equivalent to those of healthy people and better than those of AD patients. MCI, therefore, represented a detectable failure in memory in people with otherwise normal cognitive abilities. Before now, evaluating people with MCI has been difficult because researchers have had no agreed upon definition of the symptoms of the condition. The findings by Petersen and colleagues and related studies can now be used to help identify people with MCI. The study, primarily supported by the National Institute on Aging (NIA), is part of ongoing efforts to refine early clinical diagnosis of memory impairment and AD and assess brain changes that occur. Ultimately, identifying people with early memory changes will allow for timely intervention as therapies are developed.

Alzheimer's Disease

As stated previously, early detection of AD is important and can be difficult to determine. Complicating the assessment of dementia, is distinguishing it from normal aging as well as from mild cognitive impairment (MCI). Mild cognitive impairment (MCI) is a condition characterized by memory impairment with otherwise unaffected cognitive functioning.

While many elderly individuals will readily admit to any changes in the abilities listed below, many others will be hesitant to disclose any possible decline in abilities. The clinician will need to be alert to any changes in the individual: failure to arrive at the right time for appointments, difficulty discussing current events in an area of interest, and changes in behavior or dress. It also may be helpful to follow up on areas of concern by asking the patient or family members relevant questions.

As humans we are generally creatures of habit. Many elderly persons have followed familiar routines, social interactions, conversational skills and customs for many years. Out of longstanding experience and good social skills, many older individuals are able to function, seemingly, as usual. However, it is when the clinician asks questions that go beyond the usual simple conversational interviews and is alert for the possibility of generalizations, vague or overlearned phrases and answers that can serve to cover up deficiencies, that the true nature of any deterioration can be uncovered.

Does the person in question have increased difficulty with any of the activities listed below?

- **Learning and retaining new information:** Is more repetitive; has trouble remembering recent conversations, events, appointments; frequently misplaces objects.
- **Handling complex tasks:** Has trouble following a complex train of thought or performing tasks that require many steps such as balancing a checkbook or cooking a meal.
- **Reasoning ability:** Is unable to respond with a reasonable plan to problems at work or home, such as knowing what to do if the bathroom is flooded; shows uncharacteristic disregard for rules of social conduct.
- **Spatial ability and orientation:** Has trouble driving, organizing objects around the house, finding his or her way around familiar places.
- **Language:** Has increasing difficulty with finding the words to express what he or she wants to say and with following conversations.
- **Behavior:** Appears more passive and less responsive; is more irritable than usual; is more suspicious than usual; misinterprets visual or auditory stimuli.

Positive findings in any of the areas listed above generally indicate the need for further assessment for the presence of dementia.

The current criteria for the diagnosis of Dementia of the Alzheimer's Type, according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition Text Revised (DSM-IVTR) (2000), are:

A. The development of multiple cognitive deficits manifested by both
    1. Memory impairment (impaired ability to learn new information or to recall previously learned information)
    2. One (or more) of the following cognitive disturbances:
        a. **aphasia** (language disturbance)
        b. **apraxia** (impaired ability to carry out motor activities despite intact motor function)
        c. **agnosia** (failure to recognize or identify objects despite intact sensory function)
        d. **disturbance in executive functioning** (i.e., planning, organizing, sequencing, abstracting)
B. The cognitive deficits above each cause significant impairment in social or occupational functioning and represent a significant decline from a previous level of functioning.
C. The course is characterized by gradual onset and continuing cognitive decline.
D. Other causes for the cognitive deficits have been ruled out.

Since the research that is focused on early memory loss and cognitive impairment is in the early stages, much yet needs to be learned to help clinicians determine the difference between normal aging, mild cognitive impairment and Alzheimer's disease and other dementias.

As stated previously, early detection of AD is important and can be difficult to determine. Complicating the assessment of dementia, is distinguishing it from normal aging as well as from MCI. MCI is a condition characterized by memory impairment with otherwise unaffected cognitive functioning.

**Recent Research on Healthy Aging Compared to AD**

Many studies are underway to clarify the changes that occur during normal aging and their effects on memory and thinking skills. Learning more about the changes that occur in aging will help scientists decipher the transformation from healthy aging to AD. For example, researchers at the University of Michigan conducted a study that examined vocabulary knowledge and the ability to process, learn, and remember information among a group of people ranging in age from 20 to 90 (Park et al., 2002). They found that subtle declines in the ability to process and remember information started as early as the 20s and that the declines continued throughout adulthood. In contrast, indicators of vocabulary and general knowledge improved across the 20 to 90 age range.

These results are surprising because they indicate that cognitive decline starts early in adulthood and because it seems to happen at the same rate for many different cognitive tasks. The finding of increasing general knowledge in the face of declining memory performance suggests that older adults may process information and react to it more slowly than younger adults. However, this lag may be offset by knowledge accumulated over the years. Because the investigators examined a group of people at different ages between 20 and 90 during one time period rather than following the same people over time from age 20 to 90, they caution that factors other than age may have been responsible for the pattern of steady cognitive decline. These factors, such as illnesses or differences in life experiences, need to be considered to be sure that the changes seen are age-related.

Another study, conducted by researchers at Washington University in St. Louis, followed up on earlier research that has consistently found that different brain regions are activated less in older than in younger adults during cognitive tasks, even when they are performing the same task (such as taking a memory test). The reasons for this difference are unknown, but the increasingly

sophisticated use of imaging technology is allowing scientists to observe patterns of brain activation in humans and to learn more about the areas of the brain necessary for performing specific cognitive tasks. This improved knowledge will help scientists understand what areas of the brain may be most vulnerable, and at what times.

In this study, the researchers used functional magnetic resonance imaging (FMRI) to image brain activity in the frontal cortex of younger and older adults as they performed memory tasks. They found that when neural resources are no longer available (nonselective recruitment) the brain makes use of other regions to accomplish the task. The researchers also found that older adults in their late 60s and in their 80s both showed under-recruitment, but that nonselective recruitment was most likely to emerge only in the oldest adults. This underrecruitment finding suggests that cognitive training strategies in late middle age could help to lessen age-related cognitive decline in some adults.

**Alzheimer's Disease Risk Factors**

Researchers have not yet fully uncovered what causes Alzheimer's disease but, it seems clear that AD develops as a result of a complex cascade of events inside the brain that take place over many years. The disease may be triggered by any number of small changes in this cascade, probably as a result of the interaction of different genetic and non-genetic factors in different individuals (ADEAR, 2000).

Genetic Factors in the Development of Alzheimer's Disease

Two types of Alzheimer's disease exist: familial AD (FAD), which follows a certain inheritance pattern, and sporadic AD, where no obvious inheritance pattern is seen. Because of differences in the age at onset, AD is further described as early-onset (occurring in persons younger than 65) or late-onset (occurring in those 65 and older). Early onset AD is rare, about 5 to 10% of cases, and generally affects persons aged 30 to 60. Early-onset AD also often progresses faster than the more common, late-onset form (ADEAR, 2000).

All FAD known so far has an early onset, and as many as 50% of FAD cases are known to be caused by defects in three genes located on three different chromosomes. Some families have mutations in the APP gene located on chromosome 21, which causes an abnormal APP protein to be produced; others have mutations in a gene called presenilin 1 located on chromosome 14, which causes an abnormal presenilin 1 protein to be produced; and still others have mutations in a very similar gene called presenilin 2 located on chromosome 1, which causes an abnormal presenilin 2 protein to be produced.

Even if one of these mutations is present in only one of the two copies of a gene inherited from the parents, the individual will inevitably develop that form of early-onset AD. This is called autosomal dominant inheritances. However, the total known number of these cases is small (between 100 and 200 worldwide), and there is, as yet, no evidence that any of these mutations play a major role in the more common, sporadic or non-familial form of late-onset AD. Researchers are currently working to reveal the normal function of APP and presenilins and to determine how mutations of these genes cause the onset of FAD (ADEAR, 2000).

Although there is no evidence that autosomal dominant inheritance of mutated genes causes late-onset AD, genetics does appear to play a role in the development of this more common form of AD. In the early 1990s, researches at the National Institute of Aging-supported Alzheimer's Disease Center at Duke University in Durham, North Carolina, found an increased risk for late-onset AD with inheritance of one or two copies of the apolipoprotien E epsilon4 (APOE e4) allele on chromosome 19. This protein helps carry blood cholesterol throughout the body, among other functions. It is found in gial cells and neurons of healthy brains, but it is also associated in excess among those with the plaques found in the brains of person with AD.

Researchers are particularly interested in three common alleles of the APOE gene: e2, e3, and e4. The finding that increased risk is linked with inheritance of the APE e4 allele has helped explain some of the variation in age of onset of AD based on whether one has inherited zero, one, or two copies of the APOE e4 allele from one's parents. The more APOE e4 alleles inherited, the lower the age of onset. The relatively rare APOE e2 allele may protect some people against the disease; it seems to be associated with a lower risk for AD and a later age of onset, if AD does develop. APOE e3 is the most common version found in the general population and may play a neutral role in AD (ADEAR, 2000; NAI, 2003).

The e4 allele occurs in about 40 percent of people with AD. The inheritance of one or two APOE e4 alleles does not predict AD with certainty. That is, unlike early onset FAD, which is caused by specific genetic mutations, a person can have one or two APOE e4 alleles and still not get the disease, and a person who develops AD may not have any APOE e4 alleles. APOE e4 increases the risk of developing AD; it does not cause the disease. It's a risk factor gene. The ways in which APOE e4 increases the likelihood of developing AD are not known with certainty, but one possible mechanism is that it facilitates beta-amyloid buildup in plaques and this contributes to lowering the age of onset of AD. Other theories involve interactions with cholesterol levels and effects on nerve cell death that are independent of its effects on plaque buildup.

Studies in recent years strongly suggest that there are additional risk factor genes for late onset AD. The NIA and the Alzheimer's Association have formed a partnership to launch a new study to help narrow the search for genes that may be risk factors for late-onset AD. Under the AD Genetics Study, researchers hope to recruit a total of 1,000 families with 2 or more living siblings with AD and one other living family member with or without AD. If you want to help with this important new study to find late-onset AD risk factor genes, contact, by e-mail: alzstudy@iupui.edu or at their web site: www.ncrad.org. A number of NIA-funded Alzheimer's Disease Centers across the country are participating in this study (NIA, 2005).

Aging

Aging, in and of itself, is the major risk factor for AD. During the course of normal aging, the brain undergoes a number of changes:

- Some neurons in some brain regions die, although most neurons important to learning do not die;
- Some neurons and their processes shrink and function less well, especially neurons in areas important to learning, memory, planning, and other complex mental activities;
- Tangles develop in neurons and plaques develop in surrounding areas in particular brain regions;
- The mitochondria in cells become more susceptible to damage (mitochondria are tiny organelles within the cell that break down glucose to release energy, which is then used by the cell to carry out is functions);
- Inflammation increases; and
- Oxidative stress increases (During normal metabolism, the body produces a molecule called a free radical. Free radicals may help cells in certain ways, such as fighting infection. However, free radicals are highly reactive, and the production of too many is called oxidative stress). Oxidative stress, which can injure cells, resulting in nerve cell damage and death, is now believed to be a major contributor to the aging process. This theory suggests that over time, damage from a free radical can build up in neurons, causing a loss in function. This damage is called oxidative damage.

In the healthy older person, the impact of these changes may be modest, resulting in various degrees of age-related memory decline. In people who develop AD, on the other hand, some of these changes are much more extreme and have devastating consequences. Researchers are

studying the processes involved in normal aging of the brain in hopes of learning more about them and the differences between normal brain aging and AD.

Other Risk Factors

Down Syndrome is a risk factor for the development of AD. Over age 40, all persons with Down syndrome, a genetic disorder, evidence plaques and tangles at autopsy although not all are symptomatic during their lifetime.

In the mid 1970's, researchers discovered that levels of the neurotransmitter acetylcholine fell sharply in people with Alzheimer's disease. Acetylcholine is a critical neurotransmitter in the process of forming memories. Moreover, it is the neurotransmitter used commonly by neurons in the hippocampus and cerebral cortex--regions devastated by Alzheimer's disease.

Since that early discovery, which was one of the first to link Alzheimer's disease with biochemical changes in the brain, acetylcholine has been the focus of hundreds of studies. Acetylcholine levels fall somewhat in normal aging but drop by about 90 percent in people with Alzheimer's disease. Researchers have turned up evidence linking this decline to memory impairment and they have looked for ways to boost its levels as a possible treatment for Alzheimer's disease.

Some research has shown that high levels of cholesterol lead to cognitive impairment and may also be a risk factor for AD. Cholesterol may play a role in the “clumping” of the beta-amyloid, leading to plaque formation (Yaffe, 2002). Other research has implicated the following: low folic acid and B-12 levels, high serum homocysteine levels, high blood pressure combined with high serum cholesterol levels.

Another active area of research is looking at links between cardiovascular disease and AD. Several studies have shown that an elevated level of an amino acid called homocysteine is associated with increased AD risk. A high homocysteine level also is a risk factor for heart disease (NIA, 2005).

In addition, scientists are looking at the cells involved in inflammation and strokes in certain regions of the brain as possible AD risk factors.

Clinical trials are underway to see whether certain compounds that affect these factors can reduce AD risk. For example, investigators are studying whether anti-oxidants from dietary supplements may help control free radicals, and whether folic acid and vitamins B6 and B12, which reduce homocysteine levels, can reduce AD risk. They are also studying how reducing inflammation may affect the progress of AD (NIA, 2005).

AD Prevalence in Hispanics

Dementia often goes unrecognized or is misdiagnosed during its early stages, and this seems to be especially true for some racial and ethnic groups, where cultural or language barriers may prevent people and their families from seeking a diagnosis. To ensure the development of more effective healthcare access and diagnostic approaches, it is important to obtain information about the prevalence and types of dementias among diverse populations. This issue is becoming increasingly important because the U.S. Census Bureau projects that between 1999 and 2030, the Hispanic population older than 65 will increase more than 300 percent, compared to increases of 81 percent for older whites and 131 percent for older African Americans.

A recent study conducted by investigators at the University of California at Los Angeles School of Medicine has provided valuable new information on the frequency of different types of dementia in a community outreach sample of Mexican and Central American Hispanics living in California (Fitten et al., 2001). Hispanics from Mexico and Central America constitute about 70 percent of all Hispanics in the United States. California was chosen for this study because about one-third

of all Hispanics in the U.S. live in the State, and 80 percent of older California Hispanics are of Mexican origin.

Because Hispanics tend not to go to memory clinics, the investigators worked with local churches, social service agencies, and other community groups to devise culturally comfortable strategies to recruit individuals with possible dementia. These strategies included flyers, 24-hour answering services, and articles in Spanish-language newspapers. A fully bilingual and bicultural staff worked with potential participants, and were especially careful to avoid creating any cultural or
social stigma associated with mental health problems. One hundred men and women aged 55 and older and their caregivers participated and were evaluated in Spanish. The presence of dementia was established using neurological evaluation, neuropsychological tests, questionnaires, laboratory tests, and brain imaging. Of the 100 participants, 65 met the research criteria for a diagnosis of dementia. Of these individuals, 25 were diagnosed with probable AD, 25 were diagnosed with vascular dementia (a type of dementia associated with strokes), 3 had mixed AD and vascular dementia, and the remaining participants had other dementia diagnoses.

This study provides information about dementias affecting a community of older California Hispanics. The proportion of study participants with AD was lower and the proportion with vascular dementia was considerably higher than expected based on previous data on whites. The percentage of depressed, non-demented individuals also was high.

This study illustrates the need for accurate and culturally relevant diagnostic evaluations and points to the importance of more effective health care access and diagnostic approaches for this important U.S. population.

**Possible Early Warning Sign**

During the American College of Neuropsychopharmacology meeting held on December 13, 2004 a talk was presented on the inability to identify ten specific scents correlating with MCI that leads to AD. In preliminary studies, researchers had found that a person's inability to detect lemon, lilacs, leather, strawberries, smoke, soap, menthol, clove, pineapple, and natural gas were the best predictors of who would eventually develop AD (Alzheimer's Association, 2004).

The study was reported by principal investigator Davangere P. Devanand, M.D., whose work was supported by the NIA as well as by the Alzheimer's Association. The researchers recruited 150 older adults with MCI and 62 with no evidence of cognitive problems, then periodically tested participants' ability to identify a variety of smells over an average of four years. Results suggest that scents of Individuals with MCI have problems with memory or other thinking skills serious enough to show up on tests but not severe enough to interfere with customary daily activities. MCI often, but not always, progresses to Alzheimer's disease. At this time, smell evaluation remains an experimental approach to predicting progression of MCI. Many factors can affect the sense of smell, including upper respiratory infections, current or past smoking, and normal variations in individual sensitivity (Alzheimer's Association, 2004). The Alzheimer's Association has a fact sheet available on their website at:
http://www.alz.org/Resources/FactSheets/FSdementia_screen.pdf.

**Initiating Assessment**

A diagnosis of Alzheimer's disease can be confirmed only through autopsy, when brain tissue can be examined for signs of the disease. However, experienced clinicians in specialized AD centers can now diagnose AD with up to 90 percent accuracy.

Early diagnosis has several important advantages:

- Other conditions can be ruled out or treated.

- If it is AD, families have more time to develop strategies for coping with the disease and to plan for the future, and can include the patient in the discussion.
- Treatments can start earlier, when they may be more effective.

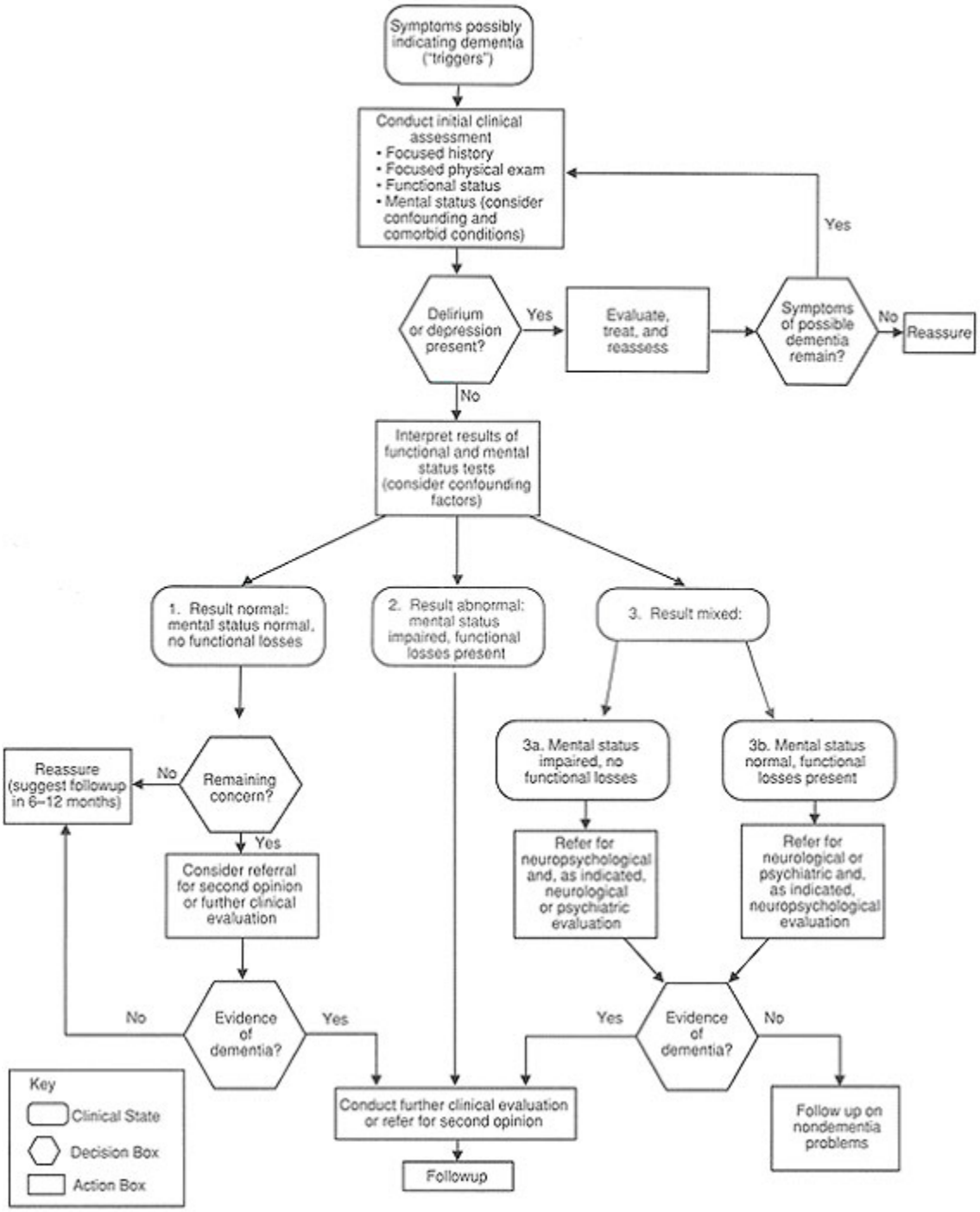
Early diagnosis also helps scientists because the development of tests that can reveal what is happening in the brain in the earliest stages of AD will help them learn more about the causes and development of the disease (NIA, 2005).

To help determine whether a patient's symptoms meet current criteria for dementia, an initial assessment should combine information from several sources. The basic components of this assessment are a focused history, a physical examination, a functional status assessment, and a mental status assessment.

It is again worth reiterating that many older individuals with cognitive decline possess excellent social skills and through long-standing practice and routines are able to answer social questions with some ease and skill. The clinician must be sensitive to words and phrases that are really "cover-ups" of cognitive decline. For example, generalizations that do not actually answer the question, or vague responses that only partially answer the question. Phrases such as "You know what I mean…"; "Oh, pretty good…"; "About the same as usual…"; "You know how it is…". The clinician must be persistent in obtaining meaningful information from the patient.

The recommended assessment process is presented in Flow Chart for Recognition and Initial Assessment of Alzheimer's Disease and Related Dementias.

## Flow Chart for Recognition and Initial Assessment of Alzheimer's Disease and Related Dementias



Focused History

A focused history is critical in the assessment for dementia. It must identify signs and symptoms and document the chronology of problems. Particularly important are:

- Mode of onset (abrupt versus gradual).
- Progression (stepwise versus continuous decline; worsening versus fluctuating versus improving).
- Duration of symptoms.

In addition to containing a detailed description of the chief complaint, a focused history should include relevant medical, family, social and cultural, and medication history, including alcohol use.

Medical History

Ask about relevant systemic diseases; psychiatric disorders; known neurological disorders, including history of head trauma; alcohol or substance abuse and exposure to environmental toxins. Because many medical conditions may cause or contribute to cognitive impairment, review information about any intercurrent, infectious, or metabolic illness, such as pneumonia, urinary tract infection, diabetes, acute or chronic renal failure.

Family History

Inquire about family history of early onset Alzheimer's disease or other rare genetic conditions that lead to dementia, such as Huntington's Disease.

Social and Cultural History

Include information about recent events and social support networks, education, literacy, and socioeconomic, ethnic, and cultural background. These factors may affect performance on mental status tests; some studies have found that they may affect the risk for dementia as well.

Medication History

This is a critical component of the initial evaluation, because drug toxicity is the most common cause of dementias that can be resolved or significantly ameliorated. A wide range of drugs have been associated with cognitive changes. Consider any drug, including over-the-counter medications, herbal remedies, and alcohol, as potentially suspect. Encourage patients to bring all medication bottles and pills to the appointment.

**Select Medications That May Cause Cognitive Impairment**

**Antiarrhythmic agents:** disopyramide, quinidine, tocainide

**Antibiotics:** cephalexin, cephalothin, metronidazole, ciprofloxacin, ofloxacin

**Anticholinergic agents:** benztropine, homatropine, scopolamine, trihexyphenidyl

**Antidepressants:** amitryptyline, imipramine, desipramine, fluoxetine

**Anticonvulsants:** phenytoin, valproic acid, carbamazepine

**Antiemetics:** promethazine, hydroxyzine, metoclopramide, prochlorperazine

**Antihypertensive agents:** propranolol, metoprolol, atenolol, verapamil, methyldopa, prazosin, nifedipine

**Antineoplastic agents:** chlorambucil, cytarabine, interleukin-2

**Antimanic agents:** lithium

**Anti-Parkinsonian agents:** levodopa, pergolide, bromocryptine

**Antihistamines/decongestants:** phenylpropanolamine, diphenhydramine, chlorpheniramine, brompheniramine, pseudoephedrine

**Cardiotonic agents:** digoxin

**Corticosteroids:** hydrocortisone, prednisone

**H2 receptor antagonists:** cimetidine, ranitidine

**Immunosuppressive agents:** cyclosporine, interferon

**Muscle relaxants:** baclofen, cyclobenzaprine, methocarbimol

**Narcotic analgesics:** codeine, hydrocodone, oxycodone, meperidine, propoxyphene

**Nonsteroidal anti-inflammatory agents:** aspirin, ibuprofen, indomethacin, naproxen, sulindac

**Radiocontrast agents:** metrizamide, iothalamate, iohexol

**Sedatives:** alprazolam, diazepam, lorazepam, phenobarbital, butabarbital, chloral hydrate

These are examples only; new medications appear regularly. Many compounds contain other active ingredients.

Informant Reports

Whenever possible, obtain the history from both the patient and reliable informants, such as family members or close friends. Informant reports can supplement information from patients who have experienced memory loss and may lack insight into the severity of their decline. Reports from relatives, however, may be influenced by the nature of the relationship to the patient. For this reason, more than one family informant or a family consensus approach can increase the accuracy of conclusions about the presence and range of cognitive impairments in persons suspected of having dementia.

When an informant is available:

- Interview the patient alone first, to respect the patient's dignity.
- Tell the patient that others will be interviewed.
- Interview informants separately from the patient to increase the likelihood of candor.

- Consider the possibility of questionable motives in informant reports. For example, symptoms may be minimized if the family is concerned about the patient's being denied admission to a nursing home; conversely, symptoms may be exaggerated or fabricated if an informant is motivated by financial or other considerations.

Focused physical examination

Use standard medical principles to guide a focused physical examination conducted as part of an initial assessment for dementia: life-threatening or rapidly progressing conditions must be identified first. Life-threatening conditions include mass lesions, vascular lesions, and infections. Assess carefully for conditions that cause delirium, which is a medical emergency requiring immediate attention (See the Assessing for Delirium section). Also be alert to signs of abuse and neglect of patients by caregivers, and report suspected abuse to the proper authorities.

Functional status assessment

Use a standardized test to evaluate functional status. For evaluating complex or difficult cases, informant based scales are particularly important.

Among standardized tests, the Functional Activities Questionnaire (FAQ) is currently the best discriminator for early stages. The FAQ is an informant based measure. Every effort should be made to find a reliable informant.

Mental status assessment

A quantitative mental status examination should be part of an initial assessment for dementia. Although comprehensive mental status examination that provides a detailed cognitive profile of the patient is desirable, it is impractical for most clinicians. Several brief, quantitative tests provide useful information about mental status. Brief mental status tests are not diagnostic. They are used to:

- Develop a multidimensional picture in conjunction with functional performance and the patient's signs and symptoms.
- Provide a baseline for monitoring the course of cognitive impairment over time.
- Reassess mental status in persons who have treatable delirium depression on initial evaluation.
- Document multiple cognitive impairments, as required for diagnosis of dementia.

Brief mental status tests feature systematic structured questions or tasks that can be scored easily. No single mental status test is clearly superior. The following four brief mental status tests are largely equivalent in their discriminative ability:

**Mini-Mental State Examination (MMSE)** - Components of cognition measured are: immediate memory, short term recall, abstract thinking, judgment, aphasia, apraxia, agnosia and constructional ability, concentration, spatial ability and orientation. Requirements for testing include: verbal responses, reading ability, writing ability, mathematical ability, vision and motor control skills. The MMSE is the most widely used brief mental status test in the United States and the most comprehensive of the brief tests; however, several studies have shown that it has

differential sensitivity for various cognitive domains. On the basis of these studies, an MMSE finding of impairments in memory and at least one other cognitive area suggests dementia, but a finding of impairment only in memory does not necessarily exclude the possibility of dementia.

**The Blessed Information Memory Concentration Test (BIMC**) - Components of cognition measured are: short term recall, concentration, spatial ability and orientation. Verbal responses are a requirement for testing.

**The Blessed Orientation Memory Concentration Test (BOMC) -** Components of cognition measured are: short term recall, concentration, spatial ability and orientation. Verbal responses are a requirement for testing.

**Short Test of Mental Status (STMS)** - Components of cognition measured are: immediate memory, short term recall, abstract thinking, constructional ability, concentration, spatial ability and orientation. Requirements for testing include: verbal responses, writing ability, mathematical ability and vision.

Information on obtaining these assessment instruments can be found in the list of resources at the end of this course. Any of the tests is acceptable, if its utility is not limited by a patient's confounding or comorbid conditions.

In diagnosing mild dementia, reliable informants' accounts of minor cognitive changes in a person suspected of dementia may be as important as or more important than quantitative assessments, which can be insensitive to mild impairment.

Confounding and Comorbid Conditions

Visual and auditory impairments and physical disabilities may affect performance on both mental status and neuropsychological tests. Assess the patient for such conditions and consider them in the selection of tests for evaluating mental status. For example, the MMSE's praxis and drawing portions make it unsuitable for a patient who has impaired motor control. In such cases, use other tests (e.g., the BIMC). When possible, correct visual and auditory deficits before testing. When this is not possible or when a physical disability is present, consider referral for neuropsychological evaluation that uses the patient unimpaired faculties and capacities. For testing any older adult, make sure that the following conditions are adequate: lighting, contrast of visual stimuli, and volume and distinctiveness of auditory stimuli.

During the focused history and physical examination, look for evidence of an acute confusional state or **delirium**, and for dysphoric mood suggesting **depression**. These conditions can be mistaken for, or coexist with, dementia; they also can occur together.

Delirium and depression need to be addressed promptly and explicitly. If symptoms suggesting dementia remain after the patient has been treated for delirium or depression, continue the assessment for dementia.

Delirium

Although delirium is common in older persons with acute or chronic illnesses, it is under recognized in clinical settings. This under recognition can have serious consequences, because delirium is a medical emergency requiring immediate further evaluation and treatment. Some of the underlying causes (e.g., bacterial meningitis or hypoglycemia) can be fatal. If delirium is recognized early, it may be possible to prevent disability and irreversible deterioration. In an

elderly person, sometimes a simple infectious process, such as a urinary tract infection, or pneumonia can also contribute to delirium. A person who displays the following symptoms is likely to have delirium rather than uncomplicated dementia:

- Sudden onset of cognitive impairment.
- Disorientation.
- Disturbances in attention.
- Decline in level of conscious/fluctuations in level of consciousness
- Perceptual disturbances (e.g., hallucinations).

The DSM-IVTR (APA, 2000) includes the following criteria for a diagnosis of delirium:

- Disturbance of consciousness (i.e., reduced clarity of awareness of the environment) with reduced ability to focus, sustain, or shift attention.
- A change in cognition (such as memory deficit, disorientation, language disturbance) or the development of a perceptual disturbance that is not better accounted for by a preexisting, established, or evolving dementia.
- The disturbance develops over a short period of time (usually hours to days) and tends to fluctuate during the course of the day.
- There is evidence from the history, physical examination, or laboratory findings that the disturbance is caused by the direct physiological consequences of a general medical condition.

In addition to common medical conditions, adverse effects of the following types of medications are also common causes of delirium:

- Anticholinergic agents.
- Antipsychotic agents.
- Antidepressants.
- Digoxin.
- H2-blocking agents.
- Antihypertensive agents.

To improve recognition of delirium, use mental status tests to identify patients with cognitive impairment, and establish the symptoms' history of onset and degree of fluctuations. Several systematic methods of assessing for delirium have been found effective (see References at end of course).

Depression

Although depression is the most common psychiatric illness in older persons, and it is the second leading cause of disability worldwide (WHO, 2000), it is often under diagnosed, especially when physical illness is present. Diagnosis is complicated because:

(a) depression is often mistaken for dementia and vice versa;
(b) each may present as the other; and
(c) they may coexist (e.g., DSM-IVTR categories of dementia with depressed mood).

Changes in memory, attention, and executive function suggest depression; marked visuospatial or language impairment suggests a dementing process.

Problems are associated with misdiagnosing dementia as depression. In addition to the unnecessary expense, inappropriate treatment for nonexistent depression in a person with progressive dementia may exacerbate the condition because antidepressants that have anticholinergic properties, such as the tricyclic antidepressant medications, may worsen confusion or memory impairment. In persons with coexisting depression and Alzheimer's disease, failure to diagnose and treat the depression may cause unnecessary emotional, physical, and social discomfort for both patient and family.

For these reasons, assessing for depression is an important part of the initial evaluation of any older adult suspected of cognitive impairment, especially for persons who complain of memory difficulty.

Major depressive disorder is a syndrome consisting of a constellation of signs and symptoms that are not normal reactions to life's stress. A sad or depressed mood is only one of the several possible signs and symptoms of major depressive disorder.

For major depressive disorder, at least five of the following symptoms are present during the same time period, and at least one of the first two symptoms must be present. In addition, symptoms must be present most of the day, nearly daily, for at least 2 weeks.

- Depressed mood most of the day, nearly every day.
- Markedly diminished interest or pleasure in almost all activities most of the day, nearly every day (as indicated either by subjective account or observation by others of apathy most of the time).
- Significant weight loss/gain.
- Insomnia/hypersomnia.
- Psychomotor agitation/retardation.
- Fatigue (loss of energy).
- Feelings of worthlessness (guilt).
- Impaired concentration (indecisiveness).
- Recurrent thoughts of death or suicide.

When obtaining the history, look for symptoms consistent with the DSM-IVTR definition of depression. If depression is suspected:

(a) evaluate further;
(b) treat appropriately (depression in older adults often responds to treatment with antidepressants, psychotherapy, electroconvulsive therapy, or all of the above); and then
(c) reassess the patient for dementia.

**Clinical interview**. The clinical interview is the mainstay for evaluating and diagnosing depression in older adults. The DSM-IVTR provides some guidance on obtaining relevant information and observations. In applying DSM-IVTR criteria, however, be aware that physical conditions or behavioral changes common among older persons may account for many DSM-IVTR symptoms of major depression, such as:

- Changes in sleep pattern or appetite.
- Fatigue.
- Behavioral slowing or agitation.
- Complaints of diminished ability to think or concentrate.

Drug interactions that result from polypharmacy also can produce depression or depression related symptoms and contribute to cognitive impairment.

**Depression assessment instruments.** Brief self-report questionnaires can facilitate initial screening for depression. The following two self-report instruments have established reliability and validity:

- T*he Geriatric Depression Scale* (GDS), developed specifically for use with older adults, is a 30-item questionnaire that has a simple yes/no format and takes only 8 to 10 minutes to administer. A 15-item form of the GDS is also available.
- *The Center for Epidemiological Studies Depression Scale* (CES-D) is a 20-item questionnaire that can be administered in 5 to 8 minutes.

Self-report instruments have shown lower frequencies of depression related symptoms in patients with Alzheimer's disease compared with informant sources or trained clinical observers. They should be used with caution for persons suspected of having dementia. Depression screening in patients suspected of dementia include information from both patient self-report and a caregiver (or informant) report, as well as direct clinician observation of the patient behavior. A good time to ask about other symptoms is right after the functional assessment.

Memory difficulty, agitation, disrupted sleep wake cycle, and personality changes (e.g., apathy, increased dependence) are classic symptoms of Alzheimer's disease that may be mistaken for depressive signs or poor concentration, decreased interest, changes in psychomotor activity, sleep disturbance and fatigue.

**Interpreting Findings**

The combination of findings from the assessments of mental and functional status can yield three possible results: (a) normal, (b) abnormal, and (c) mixed. The following recommendations, geared to each of these results, provide a framework for clinical decisions and should be used in conjunction with patient specific circumstances.

Normal Results

If findings from both the mental and the functional assessment are normal, reassure the patient and concerned family members or friends and suggest reassessment in 6 to 12 months (or whenever further concerns develop). If concerns remain, consider referral for a second opinion or for further clinical evaluation:

- For concern about the adequacy of the mental status test, refer for further neuropsychological testing.
- For concern about possible depression or other emotional problems refer for further psychiatric or psychological evaluation.
- For concern about possible loss of social and instrumental functioning caused by a neurological disorder not detected in the functional assessment, refer to a neurologist.

Abnormal Results

If findings from both the mental and the functional assessment are abnormal, the patient is likely to have a dementing illness and should have further clinical evaluation. Evaluation should include differential diagnosis, treatment, and continuing care as indicated. Guidelines for further clinical evaluation can be found in the reference section at the end of this course.

Laboratory tests may be appropriate when specific medical conditions are suspected. However, a laboratory test should not be used as a screening procedure solely to identify probable early-stage dementia or as a routine part of an initial assessment for dementia.

Mixed Results

Abnormal findings on the mental status test with no abnormalities in functional assessment or vice versa-call for further evaluation. For example:

- Patients who have abnormal results on only the mental status test require more complete neuropsychological testing. If results indicate possible neuropsychiatric or systemic neurological problems as well, refer to an appropriate specialist.
- Patients who have declining function but normal mental status test results require either (a) further neurological evaluation for systemic neurological diseases or (b) psychiatric or psychological evaluation, if evidence suggests depression or other emotional problems.

Clinical presentations that could produce mixed results include:

- A person with lifelong borderline or retarded intellectual functioning who has learned to perform routine activities of daily living (ADLs) adequately.
- A person with a dementing illness who lives in an environment where functional supports mask evidence of significant functional impairment.
- A person with high intelligence and education who scores within the normal range on a mental status test but shows clear functional decline, especially on demanding tasks (e.g., instrumental activities of daily living [IADLs]).

Importance of Cognitive Baselines

Because cognitive performance can vary from day to day, an initial assessment of cognitive impairment needs to be verified by reassessment. A cognitive baseline is an important benchmark for confirming cognitive decline and evaluating its nature and magnitude. A baseline measure is especially useful for:

- Persons of initially high cognitive ability whose early decline may be difficult to find on initial testing.
- Persons found to have only mild impairment who require several examinations conducted weeks or months apart to document stable or progressing cognitive problems.
- Persons who minimize or deny problems because of lack of insight or denial.

Confounding Factors

Assess confounding factors such as age, educational level, and cultural influences and consider them in the interpretation of mental status test scores.

**Age and educational influences**. Both age and education can affect performance on most mental status and neuropsychological tests. On the MMSE, for example, significant correlations have been found between MMSE scores and both age and years of schooling. Evidence suggests that:

- Low education increases the likelihood that an unimpaired person will test as cognitively impaired (false positive error), especially for those who have fewer than 9 years of education.
- A high educational level increases the likelihood that a cognitively impaired person will test as unimpaired (false negative error).

Age and education are factors that must be taken into account in setting the threshold for dementia for test results. As always, the clinician's knowledge of each patient should guide consideration of these confounding factors.

**Cultural influences**. Primary language, race, ethnicity, and cultural bias also can affect performance on mental status tests and some neuropsychological tests.

Research suggests that several neuropsychological tests (e.g., some Wechsler Adult Intelligence Scale Revised [WAIS-R] subtests, the FAS Controlled Oral Word Association Test) may place Hispanic persons and possibly members of other racial or ethnic groups at a disadvantage, particularly in the use of culturally inappropriate norms or cut points. The Consortium to Establish a Registry for Alzheimer's Disease (CERAD) has developed Spanish language versions of its clinical and neuropsychological assessments. Copies are available from CERAD.

Use the focused history and physical examination to evaluate English language ability. Then determine whether it is appropriate to administer an English language version of a mental status test or make a referral to someone who is competent in the patient's primary language.

**Neuropsychological Testing**

Neuropsychological assessment can make an important contribution to identification of mild dementia, particularly when delayed recall is measured. It can:

- Give information about the specific nature of strengths and deficits in cognitive functions.
- Assist in diagnosis, particularly in cases of mild impairment, high premorbid intellectual ability, or an unusual combination of cognitive impairments.
- Contribute to recommendations for treatment and management of behavior problems.
- Provide a baseline measure for judging the effects of treat or disease progression.

Neuropsychological tests can measure performance across different domains of cognition, including orientation and attention, language functions, visual motor constructional ability (praxis), memory, abstract and conceptual reasoning, and executive functions (formulating goals, planning, and executing plans). A person’s pattern of performance across such tests can help in (a) identifying dementia among persons with high premorbid intellectual functioning, (b)

discriminating patients with a dementing illness from those with focal cerebral disease, and (c) differentiating among certain causes of dementia.

Neuropsychological evaluation may be useful in certain circumstances: (a) when the mental status test is abnormal but the functional assessment is normal; (b) when a family member expresses concern or dementia is suspected and results of mental status tests are within the normal range and the patient has more than a high school education or an occupation that indicates high premorbid intelligence; and (c) when mental status test results indicate cognitive impairment and when any of the following circumstances apply to the patient:

- Low level of formal education.
- Evidence of long-term low intelligence (more than 10 years).
- Inadequate command of English for the test.
- Minority racial or ethnic background.
- Impairment in only one cognitive area on mental status tests.
- No evidence of cognitive impairment for more than 6 months.
- No evidence of functional impairments.
- Neuropsychological evaluation must be interpreted within the context of other clinical information, such as informant based history of cognitive decline; evidence of impairment in ADLs; educational background; assessment for depression; sensory impairment; and factors other than dementia that may account for impaired performance (see Confounding Factors).

**Brain Imaging**

One of the most important developments in neuroscience research during the past 10 years has been the refinement of techniques that allow scientists to look at changes in structure and function in the living brain. Currently, brain imaging techniques are already being utilized in the detection of the reversible causes of dementia, such as a brain tumor.

Although AD usually has a characteristic pattern of symptoms and can be diagnosed by history and physical exam by an experienced clinician, tests that are often done to evaluate or exclude other causes of dementia include Computed Tomography (CT), magnetic resonance imaging (MRI) and blood tests.

In the early stages of dementia, brain image scans may be normal. Magnetic resonance imaging (MRI), which can be used to measure the size of various structures in the brain. Many studies have shown that AD causes some brain structures, particularly the hippocampus (which is involved in processing memory), to shrink early on in the disease. MRI can be used to track atrophy and neuronal loss through noninvasive means. The medial temporal involvement seems to be especially key in predicting memory loss associated with AD (Bakshi, 2002). In later stages, an MRI may show a decrease in the size of the cortex of the brain or of the hippocampus. While the scans do not confirm the diagnosis of AD, they do exclude other causes of dementia such as stroke and tumor. Several teams of National Institute on Aging (NIA) funded researchers have established the usefulness of MRI as a research tool to help determine which people with memory problems are in the earliest stages of AD; to identify people who later will be diagnosed with AD; and to distinguish between people with mild cognitive impairment (MCI) and those with no memory or learning problems, and between people without AD and those with very mild AD.

Another set of imaging techniques allows scientists to visualize the activity and interactions of particular brain regions as they are used during cognitive operations such as memorizing, recalling, speaking, reading, learning, and other sorts of information processing. This window on the living brain can help scientists measure early changes in brain function or structure to identify those individuals who are at risk of Alzheimer's disease even before they develop the symptoms

of the disease. These imaging techniques include positron emission tomography (PET) scans and single photon emission computed tomography (SPECT) scans. Although these various imaging techniques are still used primarily as research tools, they hold great promise, along with other diagnostic measures, for earlier identification of persons at risk of developing AD.

**Importance of Follow-up**

Follow-up, with assessment of declining mental function, may be the most useful diagnostic procedure for differentiating Alzheimer's disease from normal aging. For this reason, repeat the mental status test over a period of 6 to 12 months and note change or stability of scores. (For the MMSE, a change of four points per year is expected in scores of persons with Alzheimer's disease.) In cases of referral, make sure test results and medical records follow the patient from the specialist back to the referring clinician. When a diagnosis of dementia is made, the patient and family members have serious issues to consider. The progressive nature of cognitive impairment makes follow-up especially important for persons with Alzheimer's disease or a related disorder; however, follow-up cannot be ensured. For this reason, the visit during which the diagnosis is given is an appropriate time for the clinician to discuss relevant issues with the patient and family or close friends, for example:

- The patient's competence to drive and carry out other routine functions that raise issues of safety (e.g., cooking); manage finances; supervise or care for grandchildren.
- Financial, legal, and medical planning, including execution of a durable power of attorney for health care.

**Treatment**

Research described earlier has vastly increased our understanding of brain function, the transformation from healthy aging to AD, and the factors that influence the development of AD. These findings have opened the doors to a range of potential therapeutic treatments.

By 2003, five medications had been approved to treat AD symptoms. Of these, four are known as cholinesterase inhibitors and are prescribed to treat mild to moderate AD symptoms. The first, tacrine (Cognex), has been replaced by three newer drugs— donepezil (Aricept), rivastigmine (Exelon), and galantamine (Reminyl). These drugs act by stopping or slowing the action of acetylcholinesterase, an enzyme that breaks down acetylcholine. Acetylcholine, a neurotransmitter that is critically important in the process of forming memories, is used by many neurons in the hippocampus and cerebral cortex—regions devastated by AD. These drugs improve some patients' abilities to carry out activities of daily living; may improve certain thinking, memory, or speaking skills; and can help with certain behavioral symptoms. However, these medications will not stop or reverse AD and appear to help patients only for months to a few years (ADEAR, 2005b).

The fifth medication is memantine (Namenda), which can be prescribed to treat moderate to severe AD symptoms. This drug appears to work by regulating excess glutamate in the brain. Glutamate is another neurotransmitter involved in memory function, but high levels may damage neurons. Like the cholinesterase inhibitors, memantine will not stop or reverse AD. Studies have shown that memantine may delay loss of daily functions in patients with moderate to severe AD (ADEAR, 2005b).

For those who are already suffering from the effects of AD, the most immediate need is for treatments to control cognitive loss as well as problem behaviors, such as verbal and physical aggression, agitation, wandering, depression, sleep disturbances, and delusions. Treatments are needed that work on many people with AD, remain effective for a long time, ease a broad range of symptoms, improve a person's cognitive function and ability to carry out that are commonly used to treat mild to moderate AD symptoms. The fifth and newest drug is used to treat moderate

to severe symptoms. However, these medications will not stop or reverse AD. Helping people with AD live their daily lives and maintain their cognitive abilities is one of the most important goals of AD treatment research. Many investigators are working to develop new and better drugs that can preserve this critical function for as long as possible. Many other investigators are improving the quality of life for patients as well as caregivers through research to develop better behavioral management techniques and caregiver skills.

Alternative Treatments

In addition to these medications, physicians use a number of drug and non-drug approaches to treat the behavioral and psychiatric problems such as agitation, verbal and physical aggression, wandering, depression, sleep disturbances, and delusions that occur frequently as AD progresses.

*Aromatherapy*

Aromatherapy employs fragrant oils, massaged into the skin. Some less-than-rigorous studies have supported the hypothesis that the utilization of aromatherapy can improve behavioral problems to the point of lessening the need for medications *(*Booker and *Flanagan, 1997)*. Perhaps in the future, more scientific studies can help tease out the critical variables that enable this procedure to work in AD patients.

*Alpha-tocopherol (Vitamin E)*

Vitamin E is an essential vitamin that has antioxidant properties. Research has shown that vitamin E can help prevent cardiovascular disease and increase immune response. As related to AD, vitamin E helps to prevent damage to brain cells by destroying toxic free radicals or binding them so as to reduce the oxidation process. In a study conducted by *The New England Journal of Medicine*, use of vitamin E delayed certain milestones associated with AD, such as loss of ability to bath, handle money, etc. 25% (ADEAR, 2005). However, vitamin E is NOT approved by the FDA and, when taken in large doses, may cause bleeding and gastrointestinal problems.

*Gingko Biloba*

According to the Alzheimer's Disease Education and Referral Center (2005b) recent research suggests that ginkgo biloba, an extract made from the leaves of the ginkgo tree, may be of some help in treating AD symptoms. There is no evidence that ginkgo will cure or prevent AD. Research continues to find out whether ginkgo biloba can delay or prevent dementia in older people.

**Research Regarding Treatment**

Treatment trials are the primary way that researchers find out whether a promising treatment is safe and effective. Some trials examine approved drugs to see if they can be used for other purposes. Other trials look at brand new compounds to see if they can help improve cognitive function or slow the progression of the disease (NIA, NIH & DHHS, 2003).

Many families find that the biggest benefit of being part of a clinical trial is the regular contact with the study team. These visits mean that a person can get state-of-the art AD care and the family can talk on an ongoing basis with experts in AD. These experts have lots of practical experience and a broad perspective on the disease. They can provide advice on the emotional and physical aspects of AD, provide suggestions on coping with the disease, and share information about support groups and other resources (NIA, NIH & DHHS, 2003).

For some years, NIH has made a big effort to improve the diversity of its research participants,

and to reach out to groups who traditionally have not participated in clinical trials. Increasing the number of older African-Americans, Asians, and Latino participants in clinical trials is a priority. Cultural or language barriers often prevent people in minority groups and their families from going to a memory clinic or seeking a diagnosis. As a result, clinical trials staff often work with local churches, social service agencies, and other community groups to find recruitment strategies that each culture will be comfortable with.

The NIA is launching a new research partnership, called the Neuroimaging and Biomarkers of AD Initiative, to study how the brain changes in Mild Cognitive Impairment (MCI) and AD and to find biomarkers of AD that could be used to shorten clinical trials (NIA, NIH & DHHS, 2003):

- Using MRIs and PET scans conducted at regular intervals, researchers hope to learn precisely when and where in the brain problems occur.

- Researchers will also examine blood samples, cerebrospinal fluid, and possibly urine, to check for higher levels of abnormal substances that could be considered “biomarkers” of AD.

**Research Regarding the Prevention of Alzheimer's Disease**

Understanding how AD develops-from beginning to end-is vital for finding drugs or other factors that may slow, delay, or even prevent the disease.

Investigators are looking at a number of possibilities for drug treatments. For example, inflammation of tissue in the brain and overproduction of free radicals are two processes that are thought to be a feature of AD. Clinical trials in both of these areas are looking at whether specific anti-inflammatory agents and agents that protect against oxidative damage can slow or prevent the development of AD (ADEAR, 2005).

Scientists are also conducting clinical trials to see if substances already used to reduce cardiovascular risk factors also help lower AD risk or delay progression of the disease. These trials are testing whether supplementation with folic acid and vitamins B6 and B12 can slow the rate of cognitive decline in cognitively normal men and women, women at increased risk of developing dementia, and people diagnosed with AD (ADEAR, 2005).

The notion that folate might provide some special degree of protection against AD has been supported in recent years by studies linking elevated homocysteine levels with the risk of AD. Researchers at Boston University with the Framingham Study population added a neuroimaging component to the evaluation between homocysteine levels, folate, and AD (Green, 2004). They reported that elevated homocysteine levels are associated with magnetic resonance imaging (MRI) measures of silent cerebral infarcts and total cerebral brain volume in healthy middle-aged adults of the Framingham Study offspring. These studies add credibility to an upcoming multicenter trial that will examine the impact of folic acid supplements on patients with AD, to be sponsored by the National Institute on Aging through the Alzheimer's Disease Cooperative Study (Green, 2004).

A study of statins, the most common type of cholesterol-lowering drug, is also underway to see whether these drugs can slow the rate of disease progression in AD patients. In a report using data from the Cardiovascular Health Study, a longitudinal study of people over the age of 65, more evidence was presented to support a possible protective role for statins against AD. In this population, the rate of decline on the MMSE was 46% lower (0.4 points/year) in those taking statins compared with those in an untreated group for whom treatment would have been recommended based on lipid levels. This new finding joins several reports supporting the protective effect of statins along with several reports that do not support such an association (Green, 2004).

Estrogen has also been studied regarding its effect on cognitive function and memory. Studies of estrogen in postmenopausal women with mild to moderate AD did not find estrogen beneficial. In 2002 a large clinical trial showed that combined estrogen/progestin therapy taken daily for just over 5 years increased the risk of heart disease and breast cancer in some women. More recently, a substudy of that trial showed that this same therapy taken daily by women over age 65 actually increased their chance of developing dementia (ADEAR, 2005).

Another area of study involves nerve growth factor (NGF). NGF is one of several growth factors in the body that maintain the health of neurons. NGF also promotes the growth of axons and dendrites, the neuron branches that connect with other neurons and that are essential in nerve cells' ability to communicate (ADEAR, 2005).

Studies have turned up a number of clues that link NGF to the neurons that use acetylcholine as a neurotransmitter, so researchers have been eager to see what happens when NGF is added to aging brain tissue. In animal studies, researchers have been able to reverse most of the age-related neuronal shrinkage and loss of ability to make acetylcholine. This success has led to a small-scale, privately-funded gene therapy trial that is testing whether this procedure can be done safely in humans and whether it might lessen symptoms of AD (ADEAR, 2005).

A number of clinical trials are focusing on the earliest stages of the disease process. For example, scientists are developing drugs that prevent enzymes from clipping beta-amyloid out from APP. Others are working on ways to stop beta-amyloid from clumping together into plaques. Teams of investigators are also studying certain enzymes that seem to be able to break beta-amyloid into pieces after it is released from cells but before it has a chance to form into plaques (ADEAR, 2005).

Still other researchers are exploring the role of neurotransmitter systems other than acetylcholine, such as glutamate. One especially active area of research involves the possibility that a vaccine might be able to stimulate the immune system into getting rid of plaques once they have formed, stopping beta-amyloid and plaque buildup, or even getting rid of plaques once they have formed (ADEAR, 2005).

Researchers have developed transgenic mice that gradually develop AD beta-amyloid plaques in the brain. These mice are invaluable tools to test how plaques can be stopped from forming. Over the course of several studies, scientists tested the effects of injections of a vaccine composed of beta-amyloid and a substance known to stimulate the immune system (ADEAR, 2005).

They found that long-term immunization resulted in much less beta-amyloid being deposited in the brains of the mice. Similar transgenic mice that had been immunized also performed far better on memory tests than did a group of these mice that had not been immunized (ADEAR, 2005).

These exciting developments led to preliminary studies in humans to test the safety and effectiveness of the vaccine. Based on positive results, a further study was designed to measure the immune response in participants with AD who received immunizations with the beta-amyloid vaccine. Unfortunately, inflammation unexpectedly developed in the brains of some of the participants and the clinical trial was stopped. Although this setback was experienced, much valuable information was gained and other potential strategies continue to be investigated (ADEAR, 2005).

Frequently engaging in activities that involve information processing such as reading, going to museums, doing crosswords, etc. is associated with a lower risk of developing AD. The reason for this isn't entirely clear, but it may be that mentally stimulating activities are associated with protection against the factors that lead to AD (NIA, 2005).

**Conclusion**

Although AD is a growing devastating health problem with far reaching implications for the patient, family, healthcare providers and society in general, research continues to identify its origins and treatments. While the cause of AD is not yet known, much has been learned. It is clear that the early identification of AD helps to improve the course of the illness through careful assessment, planning and treatment. Healthcare providers must be knowledgeable in the early assessment of this complicated illness.

**Resources**

**Administration on Aging**
330 Independence Avenue, SW
Washington, DC 20201
(202)619-7589
Internet: http://www.aoa.dhhs.gov

The Administration on Aging (AoA) coordinates delivery of services specified by the Older Americans Act. Services are coordinated and provided through State agencies and 657 areas. The range of services provided by these Agencies on Aging (AAA) varies, but include nutrition, access, in home, and community services. Addresses and phone numbers of State and local AAAs are available from the national office. The Eldercare Locator (800-677-1116) provides a toll-free access number to locate State agency networks.

**Alzheimer's Association**
919 North Michigan Avenue
Suite 100
Chicago, IL 60611-1676
(312) 335-8700
800-272-3900 for information and local chapter referrals nationwide (24-hour)
Internet: http://www.alz.org The Alzheimer's Association is a national voluntary organization with 220 local chapters and more than 2,000 support groups. The Alzheimer's Association funds research, promotes public awareness, advocates legislation for patients and families, and provides support services, including support groups, adult day care programs, respite care programs, and telephone help lines through its national, chapter and volunteer network.

**Alzheimer's Disease Centers** (access through ADEAR; see next entry)

The National Institute on Aging, part the National Institutes of Health, supports 28 Alzheimer's Disease Centers across the country. This program provides clinical services, conducts basic and clinical research, disseminates professional and public information, and sponsors educational activities. A growing number of satellite clinics associated with this program are helping to expand diagnosis and treatment services in rural and minority communities and collect research data from a more diverse population.

- **Alzheimer's Disease Cooperative Study.** The Alzheimer's Disease Cooperative Study (ADCS) is a cooperative agreement between the National Institute on Aging (NIA) and the University of California, San Diego, to advance research in the development of drugs to treat AD. The ADCS is a consortium of medical research centers and clinics working to develop clinical trials of medicines to treat behavioral symptoms of AD, improve cognition, slow the rate of decline of AD, delay the onset of AD, or prevent the disease altogether. The ADCS also develops new and more reliable ways to evaluate patients enrolled in clinical trials.

Alzheimer's Disease Cooperative Study
University of California, San Diego
9500 Gilman Drive - 0949
La Jolla, CA 92093-0949
858-622-5880
Website: http://antimony.ucsd.edu/

- Alzheimer's Disease Education and Referral Center (ADEAR)
  PO. Box 8250
  Silver Spring, MD 20907-8250
  800-438-4380
  Fax:(301) 495-3334
  Email: adear@alzheimers.org

  The Alzheimer's Disease Education and Referral (ADEAR) Center, a service of the National Institute on Aging, provides information and publications on Alzheimer's disease for health professionals, people with Alzheimer's disease and their families, and the public. The ADEAR Center serves as a national resource for information on diagnosis, treatment issues, patient care, caregiver needs, Long-term care, education, research, and ongoing programs. In addition, the Center provides referrals to national and State resources.

**The Corporation for National Service**
Office of Public Liaison
1201 New York Avenue, NW
Washington, DC 20525
(202) 606-5000
Fax:(202) 565-2794

The Corporation for National and Community Service is a public corporation that administers Federal service programs, including AmeriCorps, the Foster Grandparent Program, and the Senior Companion Program (SCP), which provides supportive services to adults with physical, emotional, and health limitations. A major SCP emphasis is preventing or delaying institutionalization. Foster Grandparent volunteers work with children, including those with disabilities. AmeriCorps members address a range of local health issues.

**American Association of Retired Persons (AARP)**
Washington, DC
(202) 434-2277
800-424-3410

**AARP Pharmacy Price Quote Center**
800-456-2226, (open 24 hours a day)

**American Bar Association Commission on Legal Problems of the Elderly**
Washington, DC
(202) 662-8690

**Children of Aging Parents**
Levittown, PA
(215) 945-6900

**Consortium to Establish a Registry for Alzheimer's Disease (CERAD)**
Durham, NC
(919) 286-6406 or 6405

**Eldercare Locator**
1-800-677-1116
Web site: www.eldercare.gov

The Eldercare Locator is a nationwide, directory assistance service helping older people and their caregivers locate local support and resources. It is funded by the U.S. Administration on Aging, whose website at www.aoa.gov also features AD information for families, caregivers, and health professionals.

**Family Caregiving Alliance.**
690 Market Street, Suite 600
San Francisco, CA 94104
415-434-3388
Website: www.caregiver.org

The Family Caregiver Alliance (FCA) is a nonprofit organization that offers support services for those caring for adults with AD, stroke, traumatic brain injuries, and other cognitive disorders. FCA programs and services include an Information Clearinghouse for FCA's publications.

**Insurance Consumer Help line**
Washington, DC
800-942-4242

**Medicare Beneficiaries Defense Fund**
New York, NY
(212) 869-3850
800-333-4114

**Medicare Hotline**
Baltimore, MD
800-638-6833

**National Association for Continence**
Spartanburg, SC
800-BLADDER
(800-252-3337)

**National Citizen's Coalition for Nursing Home Reform**
Washington, DC
(202) 332-2275

**National Hospice Organization**
Arlington, VA
(703) 243-5900
800-658-8898

**National Institute on Aging (NIA).**
PO Box 8057
Gaithersburg, MD 20898-8057
1-800-222-2225
1-800-222-4225 (TTY)
Website: www.nia.nih.gov

Part of the National Institutes of Health (NIH), the NIA is the Federal government's lead agency for research on AD. NIA also offers information about health and aging, including the Age Page series and the NIA Exercise Kit, which contains an 80-page exercise guide and 48-minute closed-captioned video. Caregivers can find many Age Pages on the website.

**National Library of Medicine.**
8600 Rockville Pike
Bethesda, MD 20894
1-888-346-3656
Website: www.nlm.nih.gov

Part of NIH, the National Library of Medicine is the world's largest medical library with 6 million items, including books, journals, technical reports, manuscripts, microfilms, photographs and images. A large searchable health information database of biomedical journals, called MEDLINE/PubMed is accessible via the Internet. A service called MEDLINEplus links the public to general information about AD and caregiving, plus many other sources of consumer health information, including a searchable clinical trials database located at http://clinicaltrials.gov.

**National Parkinson's Foundation**
East Coast: Miami, FL
800-327-4545
West Coast: Encino, CA
800-522-8855

**National Stroke Association**
Englewood, CO
(303) 771-1700
800-STROKES

**Social Security Information**
800-772-1213
(open 7 am-7 pm in all time zones)

**U.S. Department of Veterans Affairs**
Regional Office, Veterans Assistance
Washington, DC
(202) 418-4343
800-827-1000

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**Early Identification of Alzheimer's Disease and Related Dementias**

**COURSE EXAM**

***NOTE**: After studying the downloaded course and completing the exam, you need to enter your exam answers **ONLINE**; answers cannot be answered and graded on this downloadable version of the course. To enter your answers return to NYSNA's website, www.nysna.org and click on the Logon&Learn icon. Next, log in using your username and password, chose the course, and proceed to the course exam.

1. Which of the following is NOT suggestive of the presence of dementia?

   A. Difficulty learning new information
   B. Handling complex tasks
   C. Fearfulness when in common social situations
   D. Difficulty finding the words to express one's self

2. Which of the following medications may cause cognitive impairment?

   A. Acetaminophen
   B. Propranolol
   C. Sertraline
   D. Donepezil

3. When obtaining a history on a patient with possible Alzheimer's disease, information should be obtained from family members and friends whenever possible.

   A. True
   B. False

4. When conducting a BASIC dementia assessment, all of the following should be included EXCEPT:

   A. Thorough history, including medical, family, social/cultural and medication histories
   B. Physical Exam
   C. Functional status and mental status exams
   D. Neuropsychological exam

5. The standardized tests used in early dementia are:

   1. The Functional Activities Questionnaire
   2. The Geriatric Depression Scale
   3. The Delirium Identification Exam
   4. The Mini-Mental State Exam

   A. 1 only
   B. 2 and 3
   C. 4 only
   D. 1 and 4

6. Sudden onset of cognitive impairment is likely to be a sign of

   A. Delirium
   B. Depression
   C. Dementia
   D. Delusions

7. All of these are classic symptoms of dementia that can be mistaken for depression EXCEPT:

   A. Memory difficulty
   B. Agitation
   C. Disrupted sleep wake cycle
   D. Gaining weight

8. Neuropsychological testing is indicated in all the following EXCEPT

   A. When functional assessment is normal but the mental status exam is abnormal
   B. When mental status test results indicate cognitive impairment and the patient has had little formal education
   C. When educational level is high and mental status exams are normal but family members express concern over mild cognitive changes
   D. When there is no evidence of cognitive or functional impairment

9. Patient and family education regarding dementia should include the need for planning for future financial, legal and medical situations.

   A. True.
   B. False.

10. It is useful to conduct a mental status test periodically every 6 to 12 months for differentiating Alzheimer's disease from normal aging.

    A. True
    B. False