

Understanding Alzheimer's Disease

A Review of Medical Advancements and Efforts to Address the Societal, Economic, and Personal Toll of an Impending Public Health Crisis

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of an Impending Public Health Crisis**

by Malaika Singleton, PhD

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Executive Summary

Alzheimer's Disease: Diagnosis, Prevention, and Treatment

- In 2011 the criteria for Alzheimer's disease (AD) diagnosis were updated for the first time in 27 years and now include three stages: Preclinical, Mild Cognitive Impairment, and Dementia Due to AD. The acknowledgment of AD's long development and preclinical phase provides an opportunity for earlier diagnosis and treatment, which is projected to significantly reduce health care costs and lead to better health outcomes for individuals with AD.
- Research suggests that healthy lifestyle choices and increased access to health care may have an effect on preventing AD in some individuals.
- Treatment for AD includes FDA-approved drugs that help address chemical imbalances to temporarily slow the worsening of memory and cognitive function. Antipsychotic drugs also are used "off-label" (that is, for purposes other than what they were approved for by the FDA) to treat behavioral and psychiatric problems in some individuals with AD.
- The American Psychiatric Association, the California Workgroup on Guidelines for Alzheimer's Disease Management, and the Alzheimer's Association all have guidelines that emphasize the use of non-pharmacological approaches to treating behavioral and psychiatric symptoms exhibited by AD patients before resorting to pharmacological methods of treatment. These entities also recommend the use of nonpharmacological approaches along with antipsychotics if the medications eventually are prescribed.
- While some antipsychotics have proven helpful in treating clinical symptoms associated with AD, the use of antipsychotics with elderly dementia patients is particularly troublesome because of adverse side effects, including an increased risk of death.

Alzheimer's in California: The State's Changing Demographics, the State Plan, and Other Resources to Address the Disease

- California's AD population is expected to increase by 37.5 percent between 2010 and 2025, from an estimated 480,000 to 660,000 people. This increase will continue to overwhelm unpaid AD caregivers and California's businesses will be negatively impacted from continued loss of productivity. Long-term care and Medi-Cal costs also are increased by the prevalence of AD and other dementias, impacting federal and state budgets.
- California (as well as at least 40 other states) unveiled a state plan for AD, a 10-year road map that consists of various goals and recommendations to eliminate stigma, ensure and enhance access to care, support caregivers, create an AD-proficient workforce, and advance AD research.

- California has numerous resources for individuals with AD and their caregivers, including 10 university-based Alzheimer's Disease Centers. The California Institute for Regenerative Medicine is funding promising stem cell research that focuses on discovering and developing cures for diseases such as AD.

The Federal Response to Alzheimer's: A National Plan to Prevent and Effectively Treat Alzheimer's Disease by 2025

- The National Alzheimer's Project Act (NAPA) was passed by Congress in 2010 and signed into law in 2011. This federal project required the creation of a national strategic plan to address the rapidly escalating AD crisis and coordinate AD efforts across the federal government. The project also established an Advisory Council on Alzheimer's Research, Care, and Services that consists of federal and nonfederal members.

- In 2012 the Obama administration announced the publication of the first National Plan to Address Alzheimer's Disease and an aggressive, bold research program and funding pledge to meet the plan's goal of preventing and effectively treating AD by 2025.

Alzheimer's Disease: Diagnosis, Prevention, and Treatment

Alzheimer's disease is a form of dementia that gradually destroys the brain, typically of elderly individuals, robbing the afflicted of their memories and ability to function. The disease was first described in 1906, and recent medical and scientific advances have made it possible for clinicians and research scientists to better understand the risk factors and progression of Alzheimer's disease, with the hope of better diagnosing, treating, and ultimately preventing this devastating disease.

Definitions and Background

Dementia

Dementia, the loss or decline of memory and cognition (thinking and other brain functions), has various causes. Alzheimer's disease accounts for 70 percent of all causes of dementia in Americans age 71 and over. Cerebrovascular disease, such as a stroke, is the second most common cause of dementia. Other forms of dementia can be caused by other neurological or neurodegenerative diseases, such as Parkinson's or Huntington's disease, reactions to medications, or other conditions.

Alzheimer's Disease

Alzheimer's disease (AD) is a progressive, fatal brain disorder that gradually destroys neurons (brain cells), resulting in loss of memory and other brain functions. There currently is no cure. The disease is named for German psychiatrist and neuropathologist Alois Alzheimer, who first described it in 1906.

According to the California Department of Public Health, AD is the fifth leading cause of death in California after heart disease, cancer, cerebrovascular disease, and respiratory disease as of 2010.¹

Alzheimer's Disease Biomarkers

Two brain abnormality hallmarks are found in the Alzheimer's disease brain:

- **Amyloid plaques** are clumps of sticky amyloid-beta ($A\beta$) protein that accumulate outside of neurons in the brain. This buildup of protein results in cell death, likely due to a variety of factors, including but not limited to: the toxicity of the protein buildup itself, chronic neuroinflammation due to activation of the brain's immune system, oxidative stress (cell damage caused by derivatives of oxygen, such as free radicals), and the protein deposits blocking or diminishing the ability of the brain's neuronal networks to communicate and function properly.

- **Neurofibrillary tangles (NFTs)** are found inside the cells and consist of chemically modified (hyperphosphorylated) tau protein. Normally, tau protein stabilizes microtubules, the filaments that help cells maintain their structure or cytoskeleton. In AD brains, when tau is chemically modified, these filaments become destabilized, forming neurofibrillary tangles inside the cells. The breakdown of the cell's infrastructure prevents the transport of nutrients and essential molecules, resulting in eventual cell death.

These brain abnormalities typically are used to diagnose the disease at autopsy, but now are being studied as biomarkers (naturally occurring, measurable substances or conditions that can reliably indicate the presence, absence, and severity of disease) for their use in diagnosing AD at various stages in living individuals.

Biomarkers also can be used to predict the risk of developing a disease later in life. The

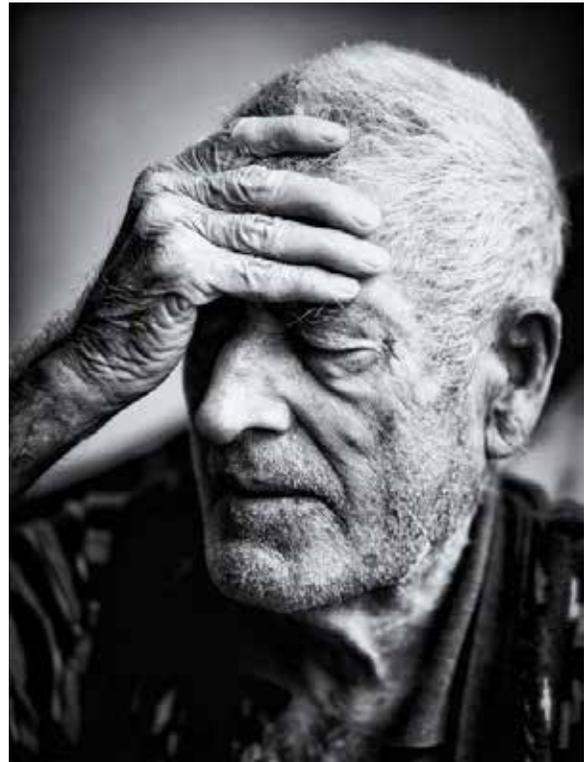
use of biomarkers is essential for timing the progression of disease and differentiating between various causes of a disease. It is important to emphasize that AD biomarkers also have been found—though usually to a lesser extent—in the brains of people who did not develop AD. It is unclear whether these individuals would have developed Alzheimer's had they lived longer, or if they were somehow resistant to developing the disease.

AD is characterized by a loss of neuronal connections and neuronal cell death in regions of the brain associated with memory, thought, learning, emotion, behavior, sensations, and movement. It also has been established that in Alzheimer's disease there is a disturbance of several neurotransmitter systems—chemicals released by neurons essential for cellular communication and function. Current Alzheimer's disease drug treatments are designed to temporarily help stabilize and rebalance the amount of these chemicals in the brain.

Alzheimer's Disease Risk Factors

Age is the most significant risk factor for developing Alzheimer's disease, as its prevalence doubles every five years beyond age 65, but reaches almost 50 percent for those 85 and older. However, there are many who live to an advanced age and never develop AD, which suggests other factors are at play, such as higher levels of education and healthier lifestyles.

Although much rarer than the sporadic cases of AD that primarily affect the elderly population, there are cases of early-onset AD, which can strike individuals before age 65 and, when there is an inherited genetic cause, even some individuals in their thirties and forties. These devastating cases account for 1 to 6 percent of all AD cases. Familial AD cases have provided a wealth of information about inherited genetic risk factors, such as mutations in genes that affect the processing or production of the amyloid-beta protein, which is toxic to the brain. However, only 60 percent of the early-onset AD cases are



Dementia—the Loss or Decline in Memory and Cognition—Has Various Causes

Alzheimer's disease accounts for 70 percent of all causes of dementia in Americans aged 71 and older. Cerebrovascular disease, such as a stroke, is the second most common cause of dementia. Other forms of dementia can be caused by other neurological or neurodegenerative diseases, reactions to medications, or other conditions.

familial, leaving scientists puzzled as to why some people develop AD earlier than usual.

A genetic risk factor for both heart disease and AD includes inheriting a form of apolipoprotein E (APOE, pronounced ap-oh-ee). APOE is a gene that produces a protein essential for moving various molecules, including fat and cholesterol, through the bloodstream so they can be broken down to produce energy (fuel) for

the body or serve other important functions.

APOE exist in three major forms called epsilons 2, 3, and 4, commonly written as E2, E3, and E4. Everyone inherits a form of APOE from each parent, and the E3 form is the most common form found in the general population. However, inheriting just one copy of the E4 gene increases one's risk for developing AD. Inheriting both copies of the E4 gene leads to an even greater risk of developing AD. This difference occurs because some forms of APOE are better at transporting and breaking down molecules than others. When a person inherits the E4 gene, cholesterol can build up in the arteries, increasing the risk of heart disease or stroke. This malfunction also can prevent the processing or breakdown of other molecules, such as amyloid-beta, which results in a buildup of plaques in the brain, a hallmark of AD. Yet just because an individual inherits a "bad" form of APOE does not mean he or she automatically will get AD, as lifestyle and other factors have an impact on health outcomes.

Prevention of Alzheimer's Disease

Researchers have discovered that the same risk factors for heart disease, such as diabetes, also are associated with an increased risk of AD and other dementias. A University of California, San Francisco, study published in 2011 suggests half of all AD cases may be prevented with lifestyle changes and the prevention or treatment of chronic health conditions. The study found that the most changeable risk factors in the U.S., in descending order of magnitude, are physical inactivity, depression, smoking, midlife hypertension, midlife obesity, cognitive inactivity or low educational attainment, and diabetes.²

While a causal link between these risk factors and AD has not been definitively proven—and there are no guarantees a healthy lifestyle will prevent AD entirely—the results of this and other studies are promising and, at the very least, may provide a cost-effective way to delay the onset of dementia in some individuals.

New Criteria for Diagnosis: Three Stages of Alzheimer’s Disease

The National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer’s Disease and Related Disorders Association work group established the criteria for the clinical diagnosis of AD in 1984. Between 2009 and 2010, an international consensus of academic and industry researchers emerged to revise the criteria for diagnosis to incorporate state-of-the-art advances in science and the understanding of AD and other dementias.

Under the direction of the National Institute on Aging and the Alzheimer’s Association, work groups were formed to establish a process for revising diagnostic and research criteria for the spectrum of AD. In April 2011 the new criteria and guidelines were published online in *Alzheimer’s and Dementia: The Journal of the Alzheimer’s Association*, and, for the first time, these guidelines established three stages of the disease with a spectrum (or continuum) between—and within—each stage. Because AD is a slow, progressive disorder, it is difficult to define its onset or specify when

transitions occur from the asymptomatic to symptomatic phases, and there is still some uncertainty in the diagnostic process. However, the new diagnostic criteria are significant and useful for clinical, research, and treatment approaches.



Can Alzheimer’s Disease Be Prevented?

A 2011 U.C. San Francisco study found that half of all Alzheimer’s disease cases may be prevented with lifestyle changes and the prevention or treatment of chronic health conditions. The most changeable risk factors in the U.S. are, in order of magnitude: physical inactivity, depression, smoking, midlife hypertension, midlife obesity, cognitive inactivity or low educational attainment, and diabetes.

Significance: Early Detection and Treatment

Prior to the revised diagnostic criteria, most AD diagnoses occurred at later stages of the disease, when the patient was fully symptomatic and already had suffered substantial memory loss and cognitive decline. The updated criteria for diagnosis emphasize that Alzheimer's disease is a spectrum (or continuum) that develops over many years from an early, preclinical phase, to an intermediate phase of mild cognitive impairment, to full-blown dementia due to AD. The preclinical phase can last a decade or more before any symptoms of memory loss or cognitive impairment become noticeable. The criteria emphasize cutting-edge research methodologies and provide a framework to study and characterize AD years before it creates substantial problems for the patient, which may lead to a better understanding of the disease as well as improved ways to treat its symptoms and delay—or even prevent—the onset of Alzheimer's disease.

Stage 1: Preclinical

The term *preclinical* means an individual's memory and cognitive abilities are intact and warrant no concern from the individual, family members, or physicians, but the individual lives with undetected, abnormal changes in the brain, such as amyloid plaque deposits and neurofibrillary tangles, which are confirmed at autopsy. Advances in neuroimaging (brain scans) and cerebrospinal fluid measurements provide additional ways to detect evidence of the AD process in living individuals. Because changes in brain structure and function as a result of AD are thought to begin many years before an actual diagnosis of AD dementia, the long preclinical phase of AD provides a critical opportunity for therapeutic intervention.

It is important to emphasize that the term preclinical is not meant to imply that all individuals who meet the criteria for this diagnosis will progress to AD dementia, because genetic and other factors also can

have an effect on health outcomes. More research is needed to better determine who eventually will develop AD and which biomarkers are better predictors. Therefore, this stage is for research purposes only and is not diagnosed in clinical settings. However, this stage is still crucial for characterization and development of prevention strategies.

Stage 2: Mild Cognitive Impairment Due to Alzheimer’s Disease

Mild cognitive impairment (MCI) is the symptomatic pre-dementia phase of AD. Clinicians have concluded that MCI is the phase of AD when individuals undergo a gradual, progressive decline in cognitive function that results from the accumulation of amyloid protein deposits in the brain, injury to brain cells, and ultimately cell death. Because it is difficult to differentiate between normal cognition and MCI, and between MCI and dementia, the judgment of a clinician is essential.



In 2011 the Criteria for Alzheimer’s Disease Diagnosis Were Updated for the First Time in 27 Years

The new criteria for diagnosis emphasize that Alzheimer’s disease (AD) is a spectrum—or continuum—that develops over many years, from an early, preclinical phase, to an intermediate phase of mild cognitive impairment, to full-blown dementia due to AD. Imaging tools, such as the magnetic resonance imaging (MRI) brain scan pictured here, can detect changes in the brain caused by AD.

The core clinical criteria for MCI include:

- a concern regarding a change in cognition (thinking and other brain functions) that is reported by the individual, an informant (such as a family member or spouse), or an observing clinician;
- evidence of impairment in one or more cognitive domains, such as memory,

executive function, attention, language, or visuospatial skills;

- preservation of independence in functional abilities, but mild problems (such as errors, slowness) performing complex tasks, like paying bills, preparing a meal, or shopping;
- no evidence of significant impairment in social or occupational functioning (that is, symptoms are mild enough to rule out dementia).

MCI patients who subsequently develop AD typically have severe deficits in episodic memory—the ability to learn and retain new information, especially regarding personally experienced events and episodes.

Evidence of a progressive decline in cognitive function increases the certainty that an individual has MCI due to AD, therefore continuous cognitive evaluation and testing is important for accuracy of the diagnosis and to assess any potential treatment response. It is also necessary to rule out other systemic or brain diseases that

could account for the decline in cognition, such as vascular (a stroke), traumatic, medical, or other causes. Because Alzheimer's disease pathology can coexist with vascular pathology, particularly in the elderly, it can be difficult to determine which pathology is the primary cause of the cognitive decline. The detection of genetic AD risk factors and AD biomarkers can increase the certainty that the cognitive decline seen in MCI is due to AD.

Tools used in the diagnosis of MCI include:

- cognitive tests for objectively assessing the degree of cognitive impairment in an individual;
- episodic memory tests that detect immediate and delayed recall;
- other neuropsychological tests to detect impairments in cognitive domains, such as language, attention, and executive functions.

Other simple techniques to determine a patient's ability to learn and recall new

information can be conducted by clinicians in their office. For example, the clinician might ask a patient to learn a street address and then to recall the address after a delay of a few minutes.³

Stage 3: Dementia

Alzheimer's disease dementia refers to the clinical syndrome (cognitive and behavioral changes) that arises as a consequence of disturbances in the brain's structure and function. The symptoms of cognitive and behavioral impairment represent a decline from previous levels of functioning, and they interfere with the ability to function at work or when doing other everyday activities. This stage of AD is in contrast to the previously described mild cognitive impairment (MCI) stage, where memory loss and cognitive decline is a concern, but independence in functioning is preserved.

The cognitive and behavioral impairments resulting from the final stage of AD can include:

- the inability to acquire and remember new information;
- impaired reasoning and handling of complex tasks;
- poor judgment;
- difficulty recognizing faces and objects;
- difficulty dressing or using implements;
- difficulty communicating;
- changes in personality and mood.

The revised criteria were created with the goal of making them flexible enough to be used by general health care practitioners as well as specialized researchers. Because there are numerous causes of dementia, the revised criteria consist of guidelines for all-cause dementia as well as separate guidelines for AD dementia.

Detection of Alzheimer's Disease

Cognitive impairments are detected and diagnosed using objective mental status or neuropsychological assessments (testing mental functions such as language, memory, and perception), and reports from

the individual and from a knowledgeable informant (such as a spouse) about the individual's routine history and daily affairs.

Because AD brains are characterized by brain amyloid-beta ($A\beta$) protein deposits and neurofibrillary tangles, one biomarker is the reduction of amyloid-beta protein in the AD patient's cerebral spinal fluid (CSF). The idea is, if there is less amyloid protein in the CSF then there is more protein deposited in the brain, likely disrupting communication between neurons (brain cells). Like amyloid, tau protein also can be detected in the CSF, and levels are elevated in the CSF of AD patients.

Positron emission tomography, also known as PET imaging, is another tool used in the diagnosis of AD in research settings. PET imaging is used to:

- create a three-dimensional picture of the brain;
- show areas of brain activity by using a radioactive form of sugar as a "tracer";

- show the location of amyloid plaques or other molecules in the AD brain;
- differentiate between AD and other forms of dementia.

Structural magnetic resonance imaging (MRI) is used to show areas of the brain that have become smaller as brain cells have died as a result of AD.

How Is Alzheimer's Disease Treated?

AD is a fatal and currently incurable disease that often manifests with other chronic conditions. The California Workgroup on Guidelines for Alzheimer's Disease Management recommends that treatment for AD include:

- pharmacology to treat cognitive decline and memory loss;
- appropriate structured activities for recreation and exercise;
- nonpharmacological approaches to address changes in mood and behavior, followed by pharmacological approaches, if necessary;
- treatment for comorbid (coexisting) conditions;
- end-of-life care.

The California Workgroup on Guidelines for Alzheimer's Disease Management is composed of 40 experts in the fields of Alzheimer's disease assessment, treatment, patient and caregiver education and support, and legal considerations. The work group consists of health care providers,

consumers and consumer representatives, academics, public health administrators, elder-law attorneys, and representatives of professional and volunteer organizations. The work group published the first Guideline for Alzheimer's Disease Management in 1998 and has updated it twice; the latest version was published in 2008. These guidelines are based on reviews of scientific evidence, supplemented by expert opinion when research is unavailable or inconsistent, and provide core care recommendations, covering topics such as assessment, treatment, support and education for the patient and his or her family, and legal considerations. The work group's guidelines are intended for primary care physicians so they can provide or recommend a variety of services and comprehensive care beyond medical management of AD.⁴

Drug Treatments for Memory Loss and Cognitive Decline

Neurons (brain cells) communicate using electrical and chemical signals

via connections called synapses. The strength of these signals and patterns of connections form the basis of the brain's ability to form memories and thoughts, and produce various other functions and actions, including skills and behavior. Neurotransmitters are chemicals essential for cellular communication. As Alzheimer's disease gradually kills neurons, it results in chemical imbalances in the brain, where there is too little or too much of certain chemicals the brain needs to function. Drug therapies for AD include drugs that help prevent a needed chemical from being broken down, while other drugs help protect the brain from toxicity due to too much of a certain chemical.

Drugs Approved by the Federal Drug Administration

The Federal Drug Administration (FDA) has approved five drugs⁵ for AD treatment that temporarily slow the worsening of symptoms. Donepezil (Aricept), galantamine (Razadyne), rivastigmine (Exelon), and

tacrine (Cognex) are used to help maintain the brain's level of acetylcholine, a chemical involved in memory, by inhibiting or blocking the action of enzymes called cholinesterases, which normally would break down excess acetylcholine in the brain. Because the AD brain doesn't have enough acetylcholine, the treatment is designed to turn these enzymes "off," thereby increasing the level of acetylcholine in the brain and slowing the decline in mental function. The "cholinesterase inhibitor" Aricept can be used at all stages of AD, while Razadyne, Exelon, and Cognex are used for mild to moderate cases of the disease.

The fifth drug, memantine (Namenda), is used to protect the brain from excess glutamate, a chemical involved in learning and memory that is released in large amounts as AD destroys brain cells. Under normal conditions, when glutamate is released during cellular communication, glutamate binds to NMDA (N-methyl-D-aspartate) receptor molecules on the surface of the cell or cells receiving the chemical signal. When glutamate is bound

to those receptors, calcium can flow into the cell, changing the electrochemical balance inside the cell so it can communicate with other cells in the brain's neuronal network. But as cells die during the progression of AD, glutamate is not properly inactivated or cleared from the brain, and the excess glutamate bombards surviving cells and overexposes them to calcium, which can be toxic at exceedingly high levels.

Namenda works by binding to the NMDA receptor molecules of surviving cells, thereby blocking the ability for glutamate to bind and let calcium inside. Therefore, Namenda is known as an NMDA receptor antagonist.

Namenda was approved officially by the FDA in 2003 to treat moderate to severe forms of AD. Doctors often prescribe Namenda and other drugs for “off-label” purposes, that is, for other than what the drug was approved for by the FDA. In the case of Namenda, the intent of the off-label prescribing is to treat mild cognitive impairment and mild cases of AD; however, a 2011 study suggests

Namenda is ineffective in the treatment of mild AD cases.⁶

Treating Psychiatric and Behavioral Symptoms of Alzheimer’s Disease: Nonpharmacological Options

In addition to memory loss and cognitive decline, individuals with AD can have behavioral and psychiatric symptoms, such as sleep disturbances, verbal and physical outbursts, hallucinations, and delusions.

Both the California Workgroup on Guidelines for Alzheimer’s Disease Management and the Alzheimer’s Association recommend treating behavioral and psychiatric symptoms of AD with nonpharmacological approaches, such as environmental modification, task simplification, appropriate activities, and by seeking support from social services or support organizations. They emphasize that nonpharmacological approaches are to be used first—before any medications are prescribed to treat

behavioral or psychiatric problems. The Alzheimer’s Association cautions that drugs should be used only in the most severe cases, such as when a dementia patient is a threat to himself or herself or to others. Furthermore, the association says medications are most useful when combined with nonpharmacological approaches, and they should not be used to sedate or restrain dementia patients.⁷

An example of treating a behavioral or psychiatric symptom with nonpharmacological approaches includes the treatment of sleep disturbances, including daytime napping due to difficulty sleeping at night, and other disturbances in the sleep–wake cycle. Non-drug treatments include: maintaining regular mealtimes and going to bed and waking up at regular times; morning sunlight exposure to aid in regular waking times; regular exercise, but no later than four hours before going to bed; avoiding alcohol, caffeine, and nicotine; treating pain; avoiding taking certain medicine before bedtime;

maintaining a comfortable bedroom temperature; using night-lights and security objects such as a blanket or stuffed animal; using the bed for sleep only; and discouraging watching television within four hours of going to bed. When non-drug approaches fail, experts recommend careful use of medication at low doses.⁸

American Psychiatric Association’s Guidelines for Alzheimer’s Disease Treatment

The American Psychiatric Association’s recommendations for AD treatment—“Practice Guideline for the Treatment of Patients With Alzheimer’s Disease and Other Dementias”—state that a careful evaluation of the underlying causes of the psychosis or agitation should be conducted first, followed by treatment of those underlying issues if it is feasible and safe. These issues could be general medical, psychiatric, environmental, and/or psychosocial (such as personality, life events, work–life stress, leisure activity, social network, and socioeconomic status) in nature.

If the symptoms persist but are not significantly distressing for the patient or others, then behavioral and environmental measures (such as reassurance and redirection) are suggested next. If symptoms still persist and are particularly dangerous and distressing, then medications are suggested at low doses, with a continual evaluation of their benefits. This pharmacological approach should occur in addition to the nonpharmacological approaches outlined on pages 21-22.⁹

Antipsychotic Drugs: Off-Label Use for Psychiatric and Behavioral Symptoms of Alzheimer’s Disease

Another reason doctors prescribe drugs off-label is to treat symptoms other than memory loss and cognitive decline that can arise in AD patients. Even though these drugs are not approved by the FDA for the treatment of dementia-related behavior and psychiatric problems, physicians have the discretion to prescribe antipsychotics, antidepressants, and anticonvulsants to manage behavioral and psychiatric

symptoms experienced by dementia patients, which might include sleep disturbances, agitation, anxiety, physical and verbal outbursts, emotional distress, delusions, and hallucinations. The inability to manage these behaviors increases the risk of institutionalization.

FDA-approved antipsychotic drugs used to treat schizophrenia and/or bipolar disorder include, but are not limited to, the following: newer atypical agents, such as aripiprazole (Abilify), olanzapine (Zyprexa), quetiapine (Seroquel), risperidone (Risperdal), ziprasidone (Geodon), and older, first-generation drugs, such as haloperidol (Haldol).¹⁰ These drugs also are prescribed to some dementia patients off-label.

Antipsychotics change the brain’s chemistry by blocking the action of certain neurotransmitter molecules, primarily dopamine and/or serotonin, which are chemicals involved in the regulation of a variety of brain functions, including mood, sleep, and other behaviors.

Research on the Effects of Antipsychotic Drugs in Dementia Treatment

A study published in 2008, conducted under the National Institute of Mental Health's Clinical Antipsychotic Trials of Intervention Effectiveness—Alzheimer's Disease project, measured the effects of atypical antipsychotics on psychiatric and behavioral symptoms, psychosis, and agitated behavior in AD patients. The results showed that some clinical symptoms improved with atypical antipsychotics after an initial period of treatment and observation. Olanzapine (Zyprexa) and risperidone (Risperdal) resulted in improvements in psychiatric symptoms, such as delusions, hallucinations, agitation/aggression, depression/dysphoria, anxiety, elation, apathy/indifference, disinhibition, irritability/lability, aberrant motor behaviors, sleep disturbances, and/or appetite and eating disorders.

Risperidone (Risperdal) led to improvements in an overall clinical assessment of a patients'

cognitive, behavioral, and functional symptoms, and improved other psychiatric and behavioral symptoms, such as hostile suspiciousness and psychosis. Olanzapine (Zyprexa) improved psychiatric and behavioral symptoms, but was found to worsen a factor known as withdrawn depression, which can be defined as emotional withdrawal, depressed mood, motor retardation, and/or blunted affect (restricted range in emotional expression/response).

Among patients continuing treatment with antipsychotics beyond the initial treatment and observation phase—those who were assessed at 12 weeks—there was no evidence the drugs improved cognitive skills (including memory, language, visual, motor, and other skills and abilities), basic and instrumental functioning (such as eating, toileting, bathing, using a telephone, and shopping), care needs, or quality of life when compared to a placebo. And the use of olanzapine (Zyprexa) actually worsened functional abilities when compared to

other antipsychotics and placebos. The results from the various clinical outcome measures indicate that AD patients can benefit from the use of antipsychotic drugs to treat particular behavioral or psychiatric issues. The clinicians who conducted the study emphasize the importance of clinician judgment in determining medication, dosage, length of treatment, and an individual's response to treatment.¹¹

Safety and Efficacy of Antipsychotic Drugs in Dementia Treatment

Although some antipsychotics are deemed modestly effective, numerous studies have raised serious doubts about the efficacy of antipsychotic drugs in the treatment of behavioral and psychiatric problems in elderly dementia patients. Studies also have demonstrated a variety of serious side effects with antipsychotic drugs, including adverse cerebrovascular events (such as a stroke) and an increased risk of death in elderly persons with dementia. In response, the FDA issued black box warnings (named for the

black border surrounding the text of the alert that appears on the package insert, label, and other literature describing a prescription medication) regarding the side effects and increased mortality risk in dementia patients who were prescribed antipsychotics. The FDA also issued a public health advisory, which noted the antipsychotic drugs are not approved for the treatment of behavioral disturbances in elderly patients with dementia, and requested manufacturers to include a boxed warning in their labeling.

The American Psychiatric Association (APA) acknowledges that clinicians face a challenge in treating patients with behavioral or psychiatric symptoms while weighing the risks associated with antipsychotics and the risks of not treating patients with antipsychotics. The APA cites evidence that has shown modest improvement for psychosis and agitation when antipsychotics were given for a limited amount of time. It also states that alternatives to antipsychotics, such as antidepressant, antianxiety, and anticonvulsant medications,

should be carefully considered as alternative drug therapies when antipsychotics are ineffective in treating behavioral and/or psychiatric symptoms in AD patients.¹²

Because adverse side effects can outweigh some antipsychotic drugs' benefits, there is a need for increased research and development of safe, effective, FDA-approved treatment options for the behavioral and psychiatric problems that arise in dementia patients who are too difficult and severely affected to be treated via nonpharmacological means. The behavioral and psychiatric symptoms exhibited are extremely distressing to the individuals and their families and often are the determining factor for placing the affected person into a residential setting, such as an assisted-living facility or a nursing home, which impacts the care and quality of life of residents, and the emotional and economic costs to families.

Alzheimer's Disease in California: The State's Changing Demographics, the State Plan, and Other Resources to Address Alzheimer's Disease

Alzheimer's disease (AD) afflicts approximately 480,000 Californians—11.2 percent—age 65 and over.¹³ The number of Alzheimer's disease cases in California will rise dramatically over the next decade and beyond, with an estimated 37.5 percent increase in AD cases between 2010 (480,000 individuals with AD) and 2025 (660,000 individuals with AD). In comparison, there was only a 9 percent increase in AD cases in the previous decade, between 2000 (440,000 individuals with AD) and 2010 (480,000 individuals with AD).¹⁴

The health and home care needs of those with AD will have an even more significant societal and economic impact on individuals and families, businesses, health care services, public programs, and the state budget in the near future. The implementation of the state's 10-year AD plan and the efficient and effective use of California's existing community- and university-based resources may help alleviate some of the burden expected from the rising number of AD cases.

California's Aging Population and Alzheimer's Disease

How Many People With Alzheimer's Reside in California?

California is home to 4.2 million people age 65 and over¹⁵ and about one-tenth of the nation's AD patients¹⁶—more than in any other state.¹⁷ Medical advances have reduced mortality for many causes of death and increased the number of people living into their eighties and nineties; this increase in the elderly population is a primary reason AD cases are expected to rise dramatically in California¹⁸—and across the globe.

The first wave of the baby boom generation (those born between 1946 and 1964) reached the age of 65 in 2011, the age at which the likelihood for AD begins to double every five years. By age 85 there is a 50 percent chance of having the disease.

Because of the large number of aging baby boomers and various social, health, environmental, and genetic risk factors, Alzheimer's disease cases in California are estimated to triple among Latinos and

Asian Americans and double among African Americans aged 55 and older by 2030.¹⁹

California's Demographics and Disparities

While Caucasians will experience the largest absolute growth in the number of individuals diagnosed with AD, the proportional increase relative to the entire Caucasian population will not be as steep as with other ethnic groups, as previously outlined. Caucasians also have a lower risk for developing AD due to higher education levels, lower rates of chronic diseases such as diabetes and heart disease, and generally better access to and use of health care services.

Risk factors including genetics, lower education levels, diabetes, heart disease, limited access or use of available health care services, a lack of representation in clinical trials and studies, and ethnic/cultural biases in current screening/assessment tools used in AD diagnosis

disproportionately affect people of color. Researchers postulate that the projected AD population is underestimated for people of color due to underreporting. People of color also are more likely to obtain a diagnosis at a later stage of the disease, which reduces or eliminates the effects of therapeutic intervention. The underreporting and late diagnoses are the result of people of color not accessing formal health care services or not reporting dementia symptoms to medical professionals.²⁰

The Kaiser Commission on Medicaid and the Uninsured, a policy institute and forum created in 1991 under the Kaiser Family Foundation, reports that racial and ethnic minorities are more likely to be uninsured and less likely to access health care services compared to whites. Latinos and Asians especially are impacted by a lack of health insurance coverage and access to care, as limited English proficiency and citizenship status also come into play. Language barriers affect the ability to discuss medical problems, complete forms and applications,

and pay bills, while citizenship status affects eligibility for benefits such as Medicaid and other health insurance programs.²¹

Caregivers of Individuals With Alzheimer’s Disease and Other Dementias

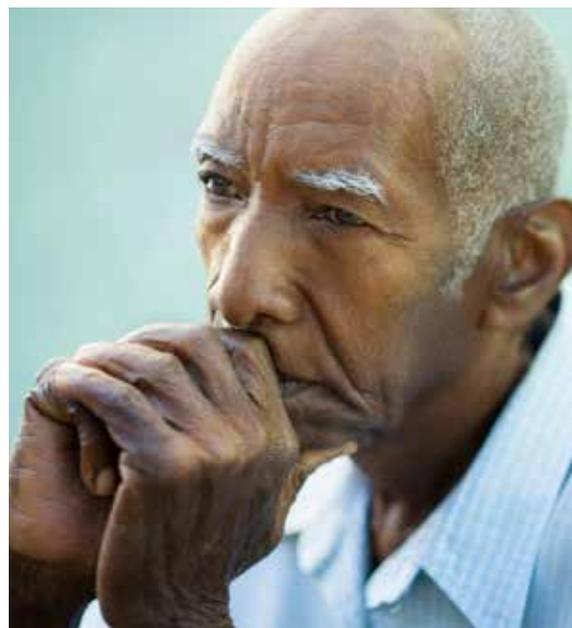
Coupled with the increase in California’s aging population, the demand for caregivers also will increase greatly. Traditionally, most caregivers have been the wives or adult daughters of the individuals with Alzheimer’s disease. Seventy-five percent of individuals living with AD are cared for at home. With more women working part- or full-time outside the home, the caregiver role can take an even greater emotional, physical, and financial toll.

Compared to other types of family caregivers, caregivers of individuals with dementia are more likely to experience greater financial hardship, increased personal health difficulties, and more emotional or other mental health

disturbances. California businesses are impacted by lost productivity from caregivers employed full-time, as they often are forced to miss work, reduce their hours, or change occupations entirely. Changes in work hours or occupation further impacts caregivers employed outside the home, as they may face financial insecurity and a loss of employer benefits.²²

Societal and Economic Impact

The growing Alzheimer's disease population will have a dramatic economic impact on all Californians, with substantial increases in the economic value of unpaid care (that is, what it would cost if formal *paid* care services were substituted for informal *free and uncompensated* care provided by family members), costs of formal services, Medicare, and Medi-Cal—all of which impact state and federal government budgets. The demand for both informal and formal care services also will increase as the population ages.



Is California Prepared to Care for Its Elderly?

The number of Alzheimer's disease (AD) cases in California will rise dramatically over the next decade and beyond, with an estimated 37.5 percent increase in cases between the years 2010 and 2025. In comparison, there was only a 9 percent increase in AD cases in the previous decade, between 2000 and 2010.

Alzheimer's Disease and Other Dementias: Considerable Contributors to Medi-Cal Costs

Medi-Cal is California's Medicaid health care program, which provides needed health care services for certain low-income individuals, including families with children, seniors, persons with disabilities, foster care children, and pregnant women. Currently, Medi-Cal is generally financed equally by the state and federal government and is the primary payer of long-term care services.

According to one estimate, Medi-Cal costs in 2007 dollars are greater for older adults with AD and other dementias compared to older adults without those conditions. The increased Medi-Cal costs are driven primarily by nursing home expenditures, which are approximately three times greater for older adults with AD and other dementias compared to older adults without dementia.²³ In addition, limited community-based programming and services may lead to increased hospitalizations and nursing home placements, which may contribute to rising Medi-Cal costs.

Due to California's recent fiscal crisis, several Medi-Cal benefits that provide services and care to seniors who may be impacted by AD and other dementias were significantly changed, eliminated, and/or reduced in the past few years. For example, the In-Home Supportive Services (IHSS) program, which provides personal care and other services to seniors, the blind, and persons with disabilities who otherwise might not be

able to remain safely in their own homes, experienced numerous changes, including service-hour reductions. Another example is the elimination of the Adult Day Health Care program (an organized day program of therapeutic, social, and health activities and services provided to seniors and adults with functional impairments) and the creation of a similar, but more limited, Community-Based Adult Services program.

During this same time, major changes in federal and state law, such as the federal Affordable Care Act, presented opportunities for reform, innovation, improved care, and potential cost savings. California's Coordinated Care Initiative, enacted in July 2012, is one example. The initiative's demonstration project, which will be implemented in eight California counties, aims to better integrate health care delivery, including medical, behavioral, and long-term care, to seniors and persons with disabilities who are dually eligible for both Medi-Cal and the federal Medicare program.

Additional Challenges

In addition to state and federal budget constraints, other cost issues include an individual's ability to pay for formal long-term care services and support when necessary. In general, Medicare and most private health insurance plans do not cover long-term care services. Individuals may purchase supplemental policies to address coverage gaps in primary insurance, but these policies can be limited and expensive. While Medicare covers limited skilled nursing facility and home health care services, there are services often needed by individuals with dementia that are not covered, including "respite" care (care provided to an individual so his or her usual caregiver can rest or take care of other responsibilities) or "custodial" nursing home care (personal care, such as help with bathing, eating, and dressing).

While Medi-Cal will cover the cost of skilled nursing facility stays, including custodial care and other long-term care services for many

people with dementia, there are eligibility requirements, including family income and age, which could lead to exclusion or require the Medi-Cal recipient to pay a share of costs. Furthermore, families may have difficulty paying for private placement in a licensed facility or for private long-term care insurance before a loved one develops dementia.

Workforce challenges include a shortage of formal (paid) caregivers and lack of health care professionals with geriatric training; these situations may lead to an increase in formal long-term care costs and put added pressure on families and unpaid caregivers.

How Is California Addressing the Growing Alzheimer’s Disease Population?

The California Alzheimer’s Disease State Plan: A 10-Year Policy Road Map

To address the growing AD public health crisis, California (as well as at least 40 other states) developed its own action plan for the 2011–2021 decade. California Senate Bill 491 (Alquist, Chapter 339, Statutes of 2008) increased the membership of the Alzheimer’s Disease and Related Disorders Advisory Committee²⁴ and tasked the committee with updating recommendations on AD and AD care. Senate Bill 491, as it was enacted, did not require the committee to develop the state plan. Instead, it required the committee to “provide planning support to the administration and the Legislature by updating recommendations of the 1987 California Alzheimer’s Disease Task Force Report and regularly reviewing and updating recommendations as needed.”²⁵

A task force was assembled with a wide range of stakeholders as well as representation from the committee,

Alzheimer’s Association, and California Health and Human Services Agency.

This task force worked with more than 2,500 people, including individuals with AD, underrepresented communities, family caregivers, health care providers, researchers, and educators to address the needs of California’s diverse, aging population and the impact AD will have on individuals, families, government, businesses, health providers, and social services. The result was a 10-year action plan, with six categories of goals and recommendations, released on March 9, 2011 (see “California’s State Plan to Address Alzheimer’s Disease” on page 37).

The committee’s goal: implement the state plan for Alzheimer’s disease over a 10-year span, with the help of various stakeholders from the public and private sectors. Over the next several years, five action plans will be developed and used to monitor annual progress in implementing and updating the state plan in the midst of changes to the state’s fiscal, health and long-term care,

political, and scientific landscapes.

The first of the five action plans was released in June 2011 and identified priorities to be taken, established timelines, and designated a responsible party to work toward achieving the goals of eliminating stigma associated with AD; ensuring access to high quality, coordinated care in the setting of choice; and developing an AD-proficient and culturally competent workforce.²⁶

Alzheimer’s Disease Plans in Other States

In a 2012 California Senate Office of Research review of 23 other states’ AD plans, the most comprehensive versions provide an overview of current services (or best practices) and present recommendations. They also suggest the entities that should be responsible for implementing the recommendations, and outline possible funding sources. Some states with well-developed plans include but are not limited to: Colorado, Michigan,

Mississippi, Oregon, South Carolina, Texas, and West Virginia.²⁷

California Alzheimer’s Disease Centers

Since 1985, California has invested more than \$90 million in 10 university-based California Alzheimer’s Disease Centers (CADCs), which then raised more than \$500 million in federal and private research funding.²⁸ However, due to the state’s recent fiscal crisis, funding was reduced by 50 percent and, as a result, research and data collection was discontinued in 2009.²⁹

Despite the funding cuts, the minimum number of new patients evaluated at each center has remained at 100 per year because there still is a need to provide direct services to patients and maintain an adequate patient base that will sustain the teaching centers’ mission. To manage the same number of patients, services have been reduced significantly, and comprehensive, multidisciplinary diagnostic

continued on page 38

California's State Plan to Address Alzheimer's Disease

To address the growing public health crisis of Alzheimer's disease, California (and at least 40 other states) developed its own state action plan: a 10-year policy road map—with six categories of goals and recommendations—which was released on March 9, 2011.

Goals and Recommendations for 2011–2021

Eliminate Stigma

- Heighten public awareness through culturally appropriate public education campaigns.
- Ensure established clearinghouses have reliable information.
- Promote consumer access to established clearinghouses.

Ensure Access to High Quality, Coordinated Care in the Setting of Choice

- Develop a comprehensive, accessible network of medical and long-term care services and support from diagnosis through end of life.
- Advocate for accessible transportation systems.
- Address the affordability of services across the long-term care continuum.

Establish a Comprehensive Approach to Support Family Caregivers

- Acknowledge and invest in the informal, unpaid caregiver as a vital participant in care.
- Sustain and expand California's statewide caregiver-support network.

Develop an Alzheimer's Proficient, Culturally Competent Workforce

- Build and expand workforce capacity and competency throughout the continuum of care.
- Improve dementia-care capacity and competency of primary care providers.

Advance Research

- Sustain and expand existing research efforts.
- Increase participation in research.

Create a Coordinated State Infrastructure That Enhances the Delivery of Care

- Implement a statewide strategy to coordinate, integrate, deliver, and monitor the continuum of care and services.
- Incorporate public health approaches to prepare for significant growth in Alzheimer's disease.
- Collect and use data to drive service development and delivery.

and treatment evaluations were eliminated. In addition, follow-up contact for each newly evaluated patient, complete follow-up reevaluations for all existing patients, clinical follow-up services, and long-term follow-up services were discontinued.³⁰

Despite these challenges, promising research on the diagnosis, treatment, and prevention of AD continues through partnerships with industry, private foundation grants, and federal funding from the National Institutes of Health's National Institute on Aging. Services now offered by the CADCs include:

- Professional training to health care workers, such as physicians, medical students, fellows, nurses, social workers, neuropsychologists, and pharmacists, who are involved in the evaluation, care, and treatment of persons with Alzheimer's disease and related disorders. (Between 2000 and 2011, 633,984 professionals and students received training and education at the CADCs and, on average, 57,635
- professionals and students receive training and education each year.)³¹
- Specialty referral clinics to provide expert diagnoses and model clinical care. (As of 2009 the CADCs had evaluated and treated more than 24,000 Californians and conducted over 35,000 follow-up assessments.)³²
- Education and community services to individuals with AD and their families. (Between 2000 and 2011, 356,845 caregivers, patients, and other community members participated in training and education provided by the CADCs; an average of 32,440 caregivers, patients, and community members are trained each year.)³³
- Research dollars, which stimulate the economy and build the health care workforce.
- Specialized knowledge provided to committees and task forces to develop and

implement policy initiatives, including:

- ▶ developing, updating, and disseminating the Guideline for Alzheimer’s Disease Management;
- ▶ serving on the California Alzheimer's Disease and Related Disorders Advisory Committee and providing expert opinion and counsel to the administration and Legislature;
- ▶ serving as members of the Alzheimer's State Plan Task Force;
- ▶ introducing and facilitating the passage of informed consent legislation (patient, conservator, or guardian authorization to undergo a medical procedure or course of treatment based on clear information regarding benefits and risks), which enables research with individuals with Alzheimer’s;
- ▶ providing successful advocacy, via expertise and knowledge, resulting in thousands of Medi-Cal individuals gaining access to dementia treatment.

California Institute for Regenerative Medicine

The California Institute for Regenerative Medicine was established in 2004 following the passage of Proposition 71, the California Stem Cell Research and Cures Initiative. This proposition provided \$3 billion in bond funding for stem cell research at California universities and other research institutions. It also established a state stem-cell agency to provide grants and loans to fund research focused on discovering and developing cures, therapies, diagnostics, and technologies to alleviate suffering from chronic disease, including AD, and injury.³⁴

Research using cellular and animal models allows researchers to study disease at every stage and manipulate genes and environments in ways that are not always possible with human subjects, which is invaluable for the discovery of early diagnostics and understanding disease progression.

Programs and Services

Numerous other programs and services throughout the state address the needs of California seniors and their caregivers, including:

From the California Department of Aging

- ▶ Disease Prevention and Health Promotion
- ▶ Family Caregiver Support Program
- ▶ Federally funded support services, including respite care, adult day care, case management, homemaker service (such as housekeeping, cooking, and grocery shopping), transportation, personal care, and information and assistance
- ▶ Health Insurance Counseling and Advocacy Program (HICAP)
- ▶ Legal Assistance
- ▶ Long-Term Care Ombudsman Program
- ▶ Multipurpose Senior Services Program (MSSP)
- ▶ Nutrition

- ▶ Senior Community Services Employment Program

From the California Department of Health Care Services

- ▶ Caregiver Resource Centers
- ▶ Medi-Cal, including Community Based Adult Services (CBAS) and other long-term care services

From the California Department of Social Services

- ▶ CalFresh Program
- ▶ In-Home Supportive Services (IHSS)

From the California Health and Human Services Agency

- ▶ Aging and Disability Resource Connection

The Federal Response to Alzheimer's Disease: A National Plan to Prevent and Effectively Treat Alzheimer's Disease by 2025

An estimated 5.2 million Americans now live with Alzheimer's (one in nine people age 65 and over live with the disease). This figure is expected to rise to more than 7 million by 2025.

In the U.S., Alzheimer's disease (AD) is the sixth leading cause of death across all ages, and the fifth leading cause of death for individuals over age 65. One in three seniors dies with AD or another dementia. Barring any significant medical breakthroughs, the number of older individuals living with AD is expected to triple to an estimated 13.8 million to 16 million by 2050.³⁵

The costs of providing health care, long-term care, and hospice care to individuals living with AD and dementia will increase, driven largely by Medicare and Medicaid expenses. A study conducted by the RAND Corporation and published in the *New England Journal of Medicine* on April 4, 2013, estimated the total monetary cost of dementia in 2010, including formal and informal caregiving, was between \$159 billion and \$215 billion nationwide, of which approximately \$11 billion was paid for by Medicare. Seventy-five to 84 percent of the dementia costs were for providing institutional (nursing home) and home-based long-term care, rather than medical services. If prevalence rates and the cost per person with dementia remain the same, these cost estimates will more than double to a range of \$379 billion to \$511 billion by 2040. The estimated cost for dementia care purchased in the marketplace (\$109 billion in 2010), is as high as the estimated direct care costs of heart disease (\$102 billion in 2010 dollars) and significantly higher than the direct care costs of cancer (\$77 billion in 2010 dollars).³⁶

The federal government has implemented legislation and published a national Alzheimer's disease plan to address this impending public health crisis, with the specific goal of finding effective ways to treat and prevent the disease by 2025.

What Is the Federal Government Doing to Address Alzheimer's?

National Alzheimer's Project Act: Public Law 111–375

The National Alzheimer's Project Act (NAPA) was initially introduced by former U.S. Senator Mel Martinez (R-Florida) in 2009 and reintroduced by U.S. Senators Evan Bayh (D-Indiana) and Susan Collins (R-Maine) in 2010. The legislation (Public Law 111–375) was passed unanimously by both houses of Congress and signed by President Obama in January 2011. NAPA requires the creation of a national strategic plan to address the rapidly escalating Alzheimer's disease crisis and coordinate AD efforts throughout the federal government.³⁷

Established in the U.S. Office of the Secretary of Health and Human Services, the purpose of NAPA is to:

- be responsible for the creation and maintenance of an integrated national plan to overcome Alzheimer's;
- provide information and coordination of Alzheimer's research and services

- across all federal agencies;
- accelerate the development of treatments that will prevent, halt, or reverse the course of Alzheimer's;
- improve the early diagnosis of Alzheimer's disease and coordination of the care and treatment of citizens with Alzheimer's;
- ensure the inclusion of ethnic and racial populations at a higher risk for Alzheimer's or those who are least likely to receive care in clinical, research, and service efforts, with the purpose of decreasing health disparities among those living with Alzheimer's;
- coordinate with international bodies to integrate and inform those working on the fight against Alzheimer's globally.

National Alzheimer's Project Act: Funding

The Congressional Budget Office (CBO) estimated in December 2010 that implementing NAPA would result in a federal spending increase of \$2 million

over the 2011–2015 period, subject to the availability of appropriated funds. The CBO also determined that U.S. Senate Bill 3036, which established NAPA, contained no intergovernmental or private-sector mandates and did not impose costs on state, local, or tribal governments.³⁸

Advisory Council on Alzheimer’s Research, Care, and Services

In May 2011, NAPA established the Advisory Council on Alzheimer’s Research, Care, and Services, which consists of federal and nonfederal members charged with holding quarterly public meetings, advising the secretary of the U.S. Department of Health and Human Services, and producing an annual report. The annual report provides evaluations of federally funded AD research and care efforts, recommendations and priority action items on programming, suggestions for reducing AD’s economic impact, and evaluations on the implementation and outcomes of those recommendations.

The council’s federal members include representatives from the Administration on Aging, Agency for Healthcare Research and Quality, Centers for Disease Control and Prevention, Centers for Medicare and Medicaid Services, Department of Veterans’ Affairs, Food and Drug Administration, Indian



Dementia Care Costs Are Driven by Nursing Home and Home-Based Long-Term Care

A 2013 RAND Corporation study found that dementia care costs in the U.S. ranged from \$159 billion to \$215 billion in 2010; the majority of the costs were associated with institutional (nursing home) and home-based long-term care, rather than medical services. The research suggests the formal and informal care costs of dementia likely make the disease more expensive than the care costs of heart disease or cancer.

Health Service, National Institutes of Health, National Science Foundation, and the Surgeon General. The nonfederal members include patient advocates, caregivers, health care providers, and others with AD-related expertise. The federal and nonfederal members serve overlapping four-year terms.³⁹

On April 17, 2012, the advisory council's public members adopted their first set of recommendations, which were refined and adopted on January 14, 2013, to suggest specific actions and deadlines that reflect the changing landscape of health care. These recommendations address the following topics:

- establishing priorities and timelines and providing adequate funding for AD research and treatment discoveries
- providing outreach to diverse communities and populations at risk for AD to address disparities
- offering caregiver support and training
- developing a system of accountability measures and cost estimates to assess AD's impact on the economy, caregivers, and worker productivity
- accelerating the development and access to therapeutic interventions and diagnostics
- investing in early detection and disease-monitoring technology
- building a dementia-capable health care workforce through increased funding and incentives for geriatric study and specialization
- including AD education in licensure or certification requirements, continuing education, recertification programs, and training for first responders, health and human service personnel, and other public servants
- redesigning Medicare coverage and physician reimbursements for the clinical diagnosis and documentation of AD, and providing care planning for individuals with AD and their families
- encouraging use of the 2011 AD diagnosis guidelines, particularly in the assessment of eligibility for long-term services and support (LTSS)

- improving chronic disease treatment and related services for individuals with AD
- developing quality measures and indicators for the comprehensive care and treatment of individuals with AD
- assuring and maintaining a robust, dementia-capable system of LTSS in every state
- funding medical-home⁴⁰ pilot projects targeted at improving medical management
- monitoring and improving end-of-life and palliative care
- reducing emergency room visits and hospitalizations for individuals with AD
- funding state plans and programs
- launching a public awareness campaign to increase awareness and promote early detection of AD
- assuring accountability for the effective implementation of the National Alzheimer’s Disease Plan

These various recommendations emphasize public–private partnerships and global efforts to prevent and effectively treat AD

by 2025, which is consistent with the national plan’s goal.⁴¹

The National Plan to Address Alzheimer’s Disease

On May 15, 2012, the Obama administration announced the release of the National Plan to Address Alzheimer’s Disease, which is guided by three principles:

- optimize existing resources and improve and coordinate ongoing activities
- support public–private partnerships
- transform the way Alzheimer’s disease is approached

The goals and strategies of this plan:

Goal 1: Prevent and effectively treat Alzheimer’s disease by 2025

- ▶ identify research priorities and milestones
- ▶ expand research aimed at preventing and treating AD

- ▶ accelerate efforts to identify early and presymptomatic stages of AD
- ▶ coordinate research with international public and private entities
- ▶ facilitate the translation of findings into medical practice and public health programs

Goal 2: Enhance care quality and efficiency

- ▶ build a workforce with the skills to provide high-quality care
- ▶ ensure timely and accurate diagnosis
- ▶ educate and support people with AD and their families upon diagnosis
- ▶ identify high-quality dementia care guidelines and measures across care settings
- ▶ explore the effectiveness of new models of care for people with AD
- ▶ ensure that people with AD experience safe and effective transitions between care settings and systems

- ▶ advance coordinated and integrated health care and long-term care services and supports for individuals living with AD
- ▶ improve care for populations disproportionately affected by AD and populations facing care challenges

Goal 3: Expand supports for people with Alzheimer’s disease and their families

- ▶ ensure receipt of culturally sensitive education, training, and support materials
- ▶ enable family caregivers to continue to provide care while maintaining their own health and well-being
- ▶ assist families in planning for future care needs
- ▶ maintain the dignity, safety, and rights of people with AD
- ▶ assess and address the housing needs of people with AD

Goal 4: Enhance public awareness and engagement

- ▶ educate the public about AD
- ▶ work with state, tribal, and local governments to improve coordination and identify model initiatives to advance AD awareness and readiness across the government
- ▶ coordinate U.S. efforts with those of the global community

Goal 5: Improve data to track progress

- ▶ enhance the federal government's ability to track progress
- ▶ monitor progress on the national plan

The national plan is intended to be a road map for accomplishing the five specified goals and is expected to be updated regularly. Implementation of the plan will be coordinated and aligned with implementation of other U.S. Department

of Health and Human Services' plans and strategies that are derived from and/or serve as critical components of the Affordable Care Act of 2010, such as Multiple Chronic Conditions: A Strategic Framework (2010); the U.S. Department of Health and Human Services' Action Plan to Reduce Racial and Ethnic Health Disparities (2011); the National Prevention Strategy (2011); and the U.S. Department of Health and Human Services' Strategic Plan, Fiscal Years 2010–2015 (2011).

Immediate Actions Taken: Increased Funding for Promising Alzheimer's Disease Research

Consistent with the National Alzheimer's Project Act's purpose of accelerating the development of treatments that will prevent, halt, or reverse the course of Alzheimer's disease, and the national plan's goal of preventing or effectively treating the disease by 2025, the Obama administration announced a historic

\$156 million investment in Alzheimer's research on February 7, 2012. This includes \$130 million of investments in new AD research for fiscal years 2012 and 2013, and \$26 million to support the national plan's goals, including education, outreach, support, and data collection. From the \$130 million dedicated to AD research, \$50 million came from the National Institutes of Health's (NIH) 2012 budget.⁴²

In May 2012 it was announced a portion of those 2012 NIH funds are supporting a clinical trial to test a drug that clears amyloid-beta in individuals who carry mutations in genes known to cause familial, early-onset AD. This is the first study of its kind that will attempt to prevent AD in individuals who are genetically guaranteed to develop the disease but who do not yet have symptoms. The clinical trial is publically and privately funded by the NIH, which provided \$16 million; the Banner Alzheimer's Institute, which provided \$15 million; and Genentech, which manufactured the amyloid-clearing drug and provided \$65 million.⁴³



What Is the Federal Government Doing to Address Alzheimer's Disease?

The National Alzheimer's Project Act requires the creation of a national strategic plan to address the Alzheimer's disease crisis. To fulfill the plan's first goal—preventing and effectively treating Alzheimer's disease by 2025—the Obama administration announced in 2012 a historic \$156 million investment in Alzheimer's disease research.

The NIH announced in January 2013 it will support additional research projects, including four clinical trials that will:

- test a drug that clears amyloid from the brain to see if it can prevent AD in older, symptom-free individuals whose brain images show abnormal levels of amyloid (individuals who are likely in the preclinical AD stage);
- test a drug for the treatment of agitation in individuals with AD;

- determine if exercise can delay the onset of AD in older adults who already have a mild cognitive impairment diagnosis;
- sample cerebrospinal fluid and plasma levels and track levels of proteins linked to AD to understand whether—or when—a drug is proving effective in treatment.

fiscal year 2012 to about \$530 million in fiscal year 2013.

The NIH-supported projects are spearheaded by the Alzheimer’s Disease Cooperative Study, a network of 70 academic medical centers and clinics set up by the NIH in 1991 to collaborate on discovering and developing AD treatments and diagnostic tools. The consortium is coordinated at the University of California, San Diego, via a cooperative agreement with the National Institute on Aging (NIA).⁴⁴ The federal research funding from the NIA will support the clinical trials over a five-year period, with \$11 million awarded in fiscal year 2013 and as much as \$55 million expected over the five-year period. Total federal support for Alzheimer’s disease research has increased from about \$500 million in

Conclusion

The year 2011 was significant for Alzheimer's disease, as the first baby boomers turned 65 years old, the National Alzheimer's Project Act was signed into law, and the criteria for AD diagnosis were officially updated after 27 years. In 2012 and 2013, other significant actions occurred, including the unveiling of the first National Plan to Address Alzheimer's Disease and the announcement of a bold research program, including clinical trials to prevent or delay the disease.

The public revelation that AD is a slow but progressive disorder that develops over many years gives hope to researchers, families, and patients that, if diagnosed early enough, there will be time to intervene therapeutically, to adjust and plan ahead, and to continue living and enjoying life as much as possible. However, as the AD population grows over the next 10 to 20 years, this daunting public health and fiscal crisis will significantly impact individuals, families, businesses, programs, health care

systems, and state and federal budgets.

The public-private partnerships, personal investment strategies, long-term care planning, and federally funded programs emphasized in the state and national plans to address Alzheimer's disease can enhance existing Alzheimer's programs and create the infrastructure needed to better aid the aging population, bringing hope to millions of people not only in the U.S., but worldwide.

Endnotes

- 1 State of California, Department of Public Health, Death Records, “Table 5-7. Deaths and Age-Adjusted Death Rates for Leading Causes of Death by Sex, California, 2006–2010,” www.cdph.ca.gov/data/statistics/Documents/VSC-2010-0507.pdf.
- 2 Deborah E. Barnes and Kristine Yaffe, “The Projected Effect of Risk Factor Reduction on Alzheimer’s Disease Prevalence,” *Lancet Neurology*, vol. 10, no. 9, 2011, p. 819-828.
- 3 Marilyn S. Albert et al., “The Diagnosis of Mild Cognitive Impairment Due to Alzheimer’s Disease: Recommendations From the National Institute on Aging—Alzheimer’s Association Workgroups on Diagnostic Guidelines for Alzheimer’s Disease,” *Alzheimer’s and Dementia: Journal of the Alzheimer’s Association*, vol. 7, no. 3, 2011, p. 271-272.
- 4 California Workgroup on Guidelines for Alzheimer’s Disease Management, “Guideline for Alzheimer’s Disease Management,” final report, 2008, p. 3, 7, 8, 10.
- 5 The brand-name drugs listed in this report are the most commonly used or cited, however there may be other brand names used for some drugs. For example, galantamine (Razadyne) is marketed in two forms: an extended-release form for once-daily dosing (Razadyne ER), and another form that is taken twice a day (Razadyne). A third form of Razadyne (Razadyne IR) is listed under the brand names for galantamine (IR stands for immediate release). Many FDA-approved drugs for AD are available in generic forms, too, and may have a different name than what is listed in this report. In addition, some of these drugs may have a different name in other countries (for example, Namenda is known as Ebixa outside of the U.S.). And as of May 2012, Cognex was discontinued in the U.S. Individuals are urged to consult with their health care professionals regarding the use of any prescribed drug, as individuals may respond differently to one form or dosage.
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Malaika Singleton, PhD

Malaika Singleton came to the California Senate Office of Research in 2010 as a California Council on Science and Technology (CCST) Policy Fellow and officially joined the office as a consultant in 2011. She has worked on public safety and education issues, and currently covers public health. She holds a bachelor's degree in biology and psychology, jointly awarded by Rutgers University—Newark College of Arts and Sciences and the New Jersey Institute of Technology, and a doctorate in neuroscience from the University of California, Davis.

Singleton began her graduate studies focusing on the neurogenetics (the role of genetics in the development and/or function of the nervous system) and neurobiology (the study of nerve cells' organization, structure, and function) of Alzheimer's disease before completing her doctoral degree on the neurogenetics and neurobiology of an autism spectrum disorder (Rett syndrome). She also once provided respite care as an assistant live-in caregiver for an individual with Alzheimer's disease.

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