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VA research on

ALZHEIMER'S DISEASE AND RELATED DEMENTIAS

VA researchers seek to understand and address the causes of Alzheimer's disease and other forms of dementia.

ABOUT ALZHEIMER'S DISEASE

- Dementia is a general term for a range of medical conditions involving a decline in memory, thinking, judgment, and learning severe enough to impair daily life. Dementia is not a disease by itself.
- Alzheimer's disease is one of the most common forms of dementia. Alzheimer's accounts for 60% to 80% of all diagnosed dementia cases. It is a progressive disease that involves the deterioration of nerve cells in the brain, which in turn affects thoughts, memory, and language.
- People with Alzheimer's disease may at first notice mild confusion and difficulty remembering things. Eventually, affected people may fail to recognize their surroundings or important people in their lives, and some undergo dramatic personality changes.
- Alzheimer's is the sixth leading cause of death in the United States—usually resulting from secondary infections, like pneumonia, that are common in incapacitated patients.
- Existing medications and management strategies may help to improve Alzheimer's symptoms, allowing people with the diagnosis to maximize their ability to function and maintain their independence

for a while. At present, however, there is no cure for Alzheimer's disease.

VA RESEARCH ON ALZHEIMER'S DISEASE: OVERVIEW

- Some areas of focus for VA's Alzheimer's research are potential drug therapies, genetic and environmental causes, and long-term care models for patients. Other researchers are working to better understand the connection between Alzheimer's and chronic diseases like diabetes.
- VA investigators are also looking at ways to support and nurture family members who care for Veterans with Alzheimer's disease in their own homes.
- The VA-University of California San Francisco [Center for Imaging of Neurodegenerative Disease](#) is devoted exclusively to magnetic resonance imaging (MRI) of the human brain, and is homing in on clues regarding Alzheimer's disease and other diseases involving the progressive loss of brain function.
- VA's Geriatric Research Education and Clinical Centers ([GRECCs](#)) have three aims: to increase knowledge of geriatric care through research, to improve health care for older Veterans through innovation,

and to provide training and education on clinical care for older adults. VA operates 20 GRECCs located throughout the United States.

SELECTED MILESTONES AND MAJOR EVENTS

- 2006** - Established the [Center for Imaging of Neurodegenerative Diseases](#) at the San Francisco VA, in collaboration with the Department of Defense
- 2011** - [Demonstrated](#) the effectiveness of an insulin-based treatment, using a special nasal delivery system, to possibly help ward off Alzheimer's
- 2014** - [Found](#) that vitamin E, an inexpensive treatment, can significantly delay functional decline among patients with mild to moderate Alzheimer's
- 2019** - [Discovered](#) a link between high LDL cholesterol and early-onset Alzheimer's
- 2020** - [Showed](#) that patients with risk factors for both Type 2 diabetes and Alzheimer's are at greater risk of functional decline than those with only one factor
- 2021** - In rodent models, [found](#) that modulating a key enzyme involved in forming amyloid plaques in the brain could prevent Alzheimer's

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RECENT STUDIES: SELECTED HIGHLIGHTS

• **Women Veterans with alcohol use disorder are at increased risk of dementia**, found a study by San Francisco VA researchers. In a group of more than 2,200 women Veterans, those with alcohol use disorder were more than three times as likely to develop dementia than those without. The team concluded that alcohol use should be considered when evaluating patient risk for dementia. ([Addiction](#), August 2021)

• **Light could be used to detect changes in the brain related to Alzheimer's disease**, based on technology developed by VA Bedford and Boston researchers. The team developed a technique that uses spectroscopy—measuring how light is scattered and absorbed when passing through matter—to identify structural changes in the brain. This scanning method could become a simple, completely non-invasive method of early Alzheimer's detection, and also has potential as a way to assess the effectiveness of treatment. ([Journal of Alzheimer's Disease](#), June 1, 2021)

• **Clumps of proteins in patients with Alzheimer's disease contain genetic material**, found a study by Central Arkansas VA researchers. The study found that protein aggregates contain DNA and RNA sequences that are specific to Alzheimer's disease. The team also found that slowing the process of protein synthesis can remove almost all

of the RNA from aggregates. The results suggest that protein aggregates play a role in causing Alzheimer's. ([Aging Cell](#), May 2021)

• **Enzyme modulation may prevent Alzheimer's disease**, found a study by a team including VA San Diego researchers. The team found that a new drug that alters a key enzyme involved in the forming of amyloid plaques in the brain can decrease plaque formation and inflammation. Plaque build-up in the brain is thought to contribute to Alzheimer's disease. The treatment was successful in tests with rodents and monkeys, paving the way for human trials. ([Journal of Experimental Medicine](#), April 5, 2021)

• **Vietnam-era Veterans with Agent Orange exposure are at increased risk of dementia**, according to a San Francisco VA study. Veterans exposed to Agent Orange were nearly twice as likely as those without exposure to be diagnosed with dementia. About 5% of Veterans with Agent Orange exposure in the study had dementia, compared with 2.5% of those with no known exposure. Those with Agent Orange exposure were also diagnosed an average of 15 months earlier. ([JAMA Neurology](#), April 1, 2021)

• **Gene therapy prevented learning and memory loss in a mouse model of Alzheimer's**, in a study by VA San Diego researchers and colleagues. The team used a harmless viral vector to introduce medication into the hippocampus of

mice with Alzheimer's-like learning and memory deficits. Learning and memory in these mice were preserved after receiving the compound, suggesting that this type of gene therapy could restore brain plasticity. ([Molecular Therapy](#), March 29, 2021)

• **One in seven people with dementia are taking at least three central nervous system medicines**, according to a study by VA Ann Arbor researchers and colleagues. The study looked at data from 1.2 million people with dementia living in the community. Older adults who take three or more medications that act on the central nervous system are at greater risk of memory problems, falls, and death. ([JAMA](#), March 9, 2021)

• **Preventing seizures after a brain injury can alleviate dementia**, found a study by Pittsburgh VA researchers. Using zebrafish, the researchers showed that seizures after traumatic brain injury are linked to abnormal tau protein levels. They found that anti-convulsant drugs can lower high levels of tau proteins in the brain—one cause of Alzheimer's disease. Seizures after TBI are a major risk factor for Alzheimer's and other dementias, and lowering tau levels could potentially alleviate this risk. ([Elife](#), Feb. 2, 2021)

For more information on VA studies on Alzheimer's disease and other key topics relating to Veterans' health, please visit www.research.va.gov/topics

VA researchers are looking at ways to delay or possibly prevent the onset of Alzheimer's disease.

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