



Foreword

For more than 90 years, VA Research has been improving Veterans' lives.

VA Research is unique in that it is the only program in the United States focused entirely on conducting research to address the full spectrum of Veterans' health needs. The program benefits from being part of a comprehensive health care system with state-of-the-art electronic medical records. Plus, most VA researchers are also clinicians who are directly involved in providing care to Veterans. Through this dynamic combination of factors, VA has become a model for conducting scientifically rigorous research—in the lab, the clinic, and the community—that is highly relevant to patients' needs. Through a variety of initiatives, VA is now working more effectively than ever to translate the results of its research into everyday care to benefit Veterans and their families—and in many cases, all Americans and people around the world.

We invite you to read through this publication and to visit our website at www.research.va.gov/topics to view the Web version, which contains links to all the references cited.



2015/16 Highlights

- **Invented a wheelchair** that allows users to crank up the push rims to a standing position, providing them with increased functionality and independence.
- Published preliminary results from a study of auditory sensory stimulation as an aid to recovery from **severe traumatic brain injury**.
- Successfully tested, in an animal model, a method whereby skin cells could potentially be converted into **insulin-producing cells to treat diabetes**.
- Reported 10-year results from the **Veterans Affairs Diabetes Trial**, which showed that tight blood sugar control could help reduce cardiovascular risk, although no survival advantage was found in the study.
- Developed, with NIH colleagues, a predictive model that can identify **Veterans at high risk of suicide** based on indicators in their electronic medical records.
- Reported results from a rigorous clinical trial of **mindfulness-based stress reduction** for PTSD.
- Found that for some smokers, **lung cancer screening** could be perceived as a substitute for quitting smoking.
- Documented higher rates of **PTSD in women** Vietnam Veterans than had previously been found.
- As part of the **SPRINT group**, published results from a major trial showing that lower blood pressure targets could have cardiovascular and survival benefits from some patients.
- For the first time in the U.S., launched a feasibility trial of **osseointegrated prosthetic implants**, which allow an artificial leg system to be anchored directly to the residual bone.
- Provided evidence to support VA's decision to make the **ReWalk robotic exoskeleton** available to Veterans with spinal cord injury who could benefit from the device.
- Developed an **electrical stimulation system** that enables people with paraplegia to pedal recumbent tricycles.
- Confirmed that **chronic traumatic encephalopathy** (CTE)—a progressive degenerative disease of the brain resulting from repeated head trauma— is distinct from Alzheimer's and other degenerative brain disorders and can be diagnosed definitively on the basis of unique patterns of protein accumulation in neurons and other brain cells, albeit only upon post-mortem examination.



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Cover photos by (clockwise from right):
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Any health information in this newsletter is strictly for informational purposes and is not intended as medical advice. It should not be used to diagnose or treat any condition.

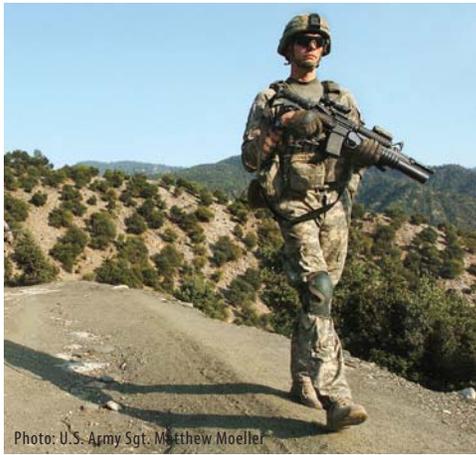


Photo: U.S. Army Sgt. Matthew Moeller



VA research on

AFGHANISTAN AND IRAQ VETERANS

VA researchers are seeking new ways to restore ill and injured Veterans from the wars in Iraq and Afghanistan to their highest level of functioning, and helping create the best life possible for them when they return home.

ABOUT AFGHANISTAN AND IRAQ VETERANS

- The newest generation of Veterans is characterized by an increased number of Reservists and National Guard members who served in combat zones; a higher proportion of women; and different patterns of injuries, such as multiple injuries from explosions, than were seen among Veterans of previous wars.
- Many service members may need mental health care after returning from duty. Service members may experience symptoms of psychological distress, such as posttraumatic stress disorder (PTSD). Other issues may include stress, mood, anxiety, sleep, psychotic, and addictive disorders.
- Veterans wounded in Iraq and Afghanistan are surviving in greater numbers than in previous conflicts due to advances in body armor, battlefield medicine, and medical evacuation transport. As a result, more Veterans are living with disabling injuries, including the often-lifelong effects of traumatic brain injury (TBI).
- Afghanistan and Iraq combat Veterans can receive cost-free medical care for any condition related to their service in the theater of war for five years after the date of their discharge or release.

VA RESEARCH ON AFGHANISTAN AND IRAQ VETERANS: OVERVIEW

- VA researchers are seeking new ways to address the mental health issues of Iraq and Afghanistan Veterans, including PTSD. They are also researching TBI and its treatment, and are developing and testing prostheses that will allow Veterans with amputations or other issues to live as independently as possible.
- VA is working on new programs and services to help Veterans reintegrate after deployment. Researchers are looking at how transitioning out of the military affects Veterans' physical and emotional health, work, finances, and social relationships.
- VA's Polytrauma System of Care is the largest integrated system of care dedicated to the medical rehabilitation of Veterans and service members with multiple injuries. Research includes examining pain, TBI, and PTSD that co-occur, known as the polytrauma clinical triad.
- The National Health Study for a New Generation of U.S. Veterans is an ongoing study of Iraq and Afghanistan Veterans aimed at providing insight on the overall health of recent Veterans, improving VA's

understanding of the health services Veterans need, and maximizing the quality of care VA offers to these Veterans.

SELECTED MILESTONES AND MAJOR EVENTS

- 2010** - Began a [longitudinal cohort study](#) of the longer-lasting health effects of service during the Iraq war
- 2011** - Funded, along with the Department of Defense (DoD), two [consortia](#) to improve treatment for PTSD and mild TBI
- 2014** - [Found](#) that Veterans who sought and received care soon after the end of their service had lower rates of PTSD upon follow-up than those who waited to get treatment
- 2015** - [Confirmed](#), by summarizing the results of 19 unique studies, that Iraq and Afghanistan Veterans had higher rates of respiratory problems during and after deployment
- 2015** - Began work with the [Henry M. Jackson Foundation for the Advancement of Military Medicine](#) and other partners to learn which programs and services are most helpful to Veterans as they reintegrate after deployment

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RECENT STUDIES: SELECTED HIGHLIGHTS

- **Regions of the brain function differently among people with PTSD**, causing them to generalize nonthreatening events as if they were the original trauma, found researchers from VA and Duke University. The findings suggest that exposure-based PTSD treatment strategies might be improved by focusing on cues that resemble the initial event, but are still distinct from it. ([Translational Psychiatry](#), Dec. 15, 2015)
- **Guerilla tactics such as suicide attacks and roadside bombs may trigger more PTSD** than conventional warfare, suggested a VA study of 738 Iraq Veterans. The trend, however, was seen only among men, not women. The researchers say a different mix of factors may influence PTSD among women service members and Veterans. ([Psychological Trauma](#), September 2016)
- **Veterans discharged for misconduct have dramatically higher rates of homelessness** than those who left the military under normal circumstances, according to VA researchers from Salt Lake City and Philadelphia. They suggest that misconduct-related separation could be used

as one possible predictor of future homelessness. ([JAMA](#), Aug. 25, 2015)

- **Blast exposure may cause microscopic damage that accelerates brain aging**, according to VA Boston Healthcare System researchers. Concussion from blast exposure is associated with neural changes such as altered white matter structure, which could affect mental function and how the brain ages. ([Brain](#), August 2015)
- **Nonsuicidal self-injury may be a particularly useful marker** of active suicidal ideation among Afghanistan/Iraq Veterans, according to a Central Texas VA Health Care System study. The study showed that Veterans who self-injured were more likely to have suicidal ideation, and recommends that these Veterans be closely monitored. ([Psychiatry Research](#), June 30, 2015)
- **Published data suggest a high prevalence of respiratory symptoms** and respiratory illness consistent with airway obstruction in Veterans deployed to Iraq and Afghanistan, according to researchers with the VA New Jersey Health Care System. Veterans deployed to Afghanistan and Iraq were likely exposed to a variety of airborne hazards, including burn pits. ([Epidemiologic Reviews](#), Jan. 14, 2015)

- **Online expressive-writing sessions helped Veterans reintegrate into society**, according to a study led by researchers from the Minneapolis VA Health Care System. The study showed that expressive writing was better than no writing at reducing PTSD symptoms, anger, distress, reintegration problems, and physical complaints. ([Journal of Traumatic Stress](#), October 2015)
- **Veterans with pain, TBI, and PTSD have no greater risk of suicide** than those who have PTSD alone. Researchers from the South Texas Veterans Health Care System found that the riskiest combination of conditions for suicide was PTSD, depression, and substance abuse. PTSD has by far the largest effect, and adding depression or substance abuse to PTSD significantly raises the risk of suicide over PTSD alone. ([American Journal of Public Health](#), February 2015)

For more information on VA studies on Afghanistan and Iraq Veterans, and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

Researchers are looking at how transitioning out of the military affects Veterans’ physical and emotional health, work life, finances, and social relationships.

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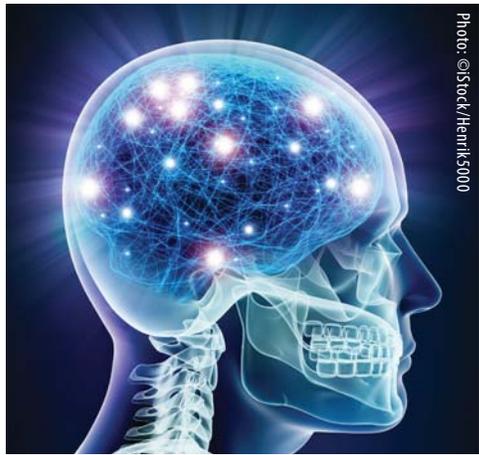


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VA research on
ALZHEIMER'S DISEASE

Alzheimer's disease is one of the most common forms of dementia. It involves the deterioration of nerve cells in the brain, which in turn affects thoughts, memory, and language.

ABOUT ALZHEIMER'S DISEASE

- Dementia is a general term for disorders involving a decline in memory, thinking, judgment, and learning ability. Although physicians can almost always determine whether a person has dementia, there is no single test that can show whether a person has Alzheimer's or is at risk for the disease.
- Alzheimer's disease is the sixth leading cause of death in the United States, with death usually coming as a result of secondary infections such as pneumonia and bladder infections common in incapacitated patients, or from the inability to follow medical instructions.
- Those with Alzheimer's may, at first, notice mild confusion and difficulty remembering. Eventually, they may fail to even recognize important people in their lives and undergo dramatic personality changes.
- Medication and management strategies may temporarily improve the symptoms of the disease, allowing patients to maximize their ability to function and maintain their independence for a while longer. However, there is presently no cure for the disease.

VA RESEARCH ON ALZHEIMER'S DISEASE: OVERVIEW

- VA researchers are looking at ways to delay or possibly prevent the onset of Alzheimer's disease. They are also developing new ways to detect the disease, to understand its connection to other illnesses and injuries, and to support those who have the difficult responsibility of caring for Veterans with Alzheimer's.
- Some VA researchers are working on potential drug therapies for prevention and treatment of Alzheimer's. Others are exploring the genetic and environmental causes of the disease, or studying the best ways to provide long-term care for patients with Alzheimer's.
- The Alzheimer's Disease Neuroimaging Initiative, led by VA researchers, is making it easier for clinicians to diagnose Alzheimer's disease in its early stages.
- VA's Center for Imaging of Neurodegenerative Disease is devoted exclusively to magnetic resonance imaging of the human brain, and is homing in on clues regarding Alzheimer's disease and other diseases involving the progressive loss of brain function.

SELECTED MILESTONES AND MAJOR EVENTS

- 2004** - Took on leadership of a nationwide [study](#) to identify brain changes linked to Alzheimer's disease
- 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
- 2015** - [Developed](#) a simple blood test that can be used to predict the buildup of amyloid in the brain, an Alzheimer's biomarker, with modest accuracy

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Compounds that inhibit two cellular proteins** can help remove the toxic plaques found in the brain of mice with

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Alzheimer's disease, according to researchers with institutions including VA's Geriatric Research Education Clinical Center in Madison, Wisconsin. The accumulation of this plaque is a key feature of neurodegenerative diseases such as Alzheimer's. ([Brain](#), March 2016)

• **Intranasal insulin detemir, a longer-lasting form of insulin**, improved cognitive functioning for patients with Alzheimer's disease or mild cognitive impairment, found researchers with the VA Puget Sound's Geriatric Research, Education, and Clinical Center and other institutions. ([Journal of Alzheimer's Disease](#), Jan. 1, 2015)

• **People living at higher altitudes may have a 50 percent lower risk** of dying of Alzheimer's disease compared with people living at lower altitudes, according to researchers with the Puget Sound and Portland VA medical centers. They say oxygen levels might play a part in these findings, but more research is needed. ([JAMA Psychiatry](#), December 2015)

• **A classification model based on cognitive and blood protein variables** can identify brain amyloidosis (the accumulation of protein in the vessels of the central nervous system).

Amyloidosis is associated with dementia and Alzheimer's disease. This research was part of the Alzheimer's Disease Neuroimaging Initiative. ([Neurology](#), Feb. 17, 2015)

• **Traumatic brain injury in older Veterans** was associated with a 60 percent increase in the risk of developing dementia, found researchers with the San Francisco VA Health Care System. This research suggests that Veterans who have had a traumatic brain injury may be more likely to develop dementia in the future. ([Neurology](#), July 22, 2014)

• **Taking supplemental vitamin E may slow functional decline** in patients with mild to moderate Alzheimer's disease, found a multicenter VA research team. The study showed that the vitamin added, on average, six months of better cognitive functions for patients with this progressive disease. ([JAMA](#), Jan. 1, 2014)

• **Younger blood may possess rejuvenating properties** that could affect aging and degeneration in the brain, according to a literature review conducted by VA Palo Alto and Stanford University researchers of

studies involving animal models. This finding suggests promising avenues for future research on blood-borne brain rejuvenation. ([JAMA Neurology](#), October 2015)

• **Prisoners of war (POWs) and Veterans with PTSD may be at increased risk of dementia**, according to researchers with the San Francisco VA Health Care System. This retrospective study showed the risk of dementia was increased in those Veterans studied who were POWs or who had PTSD, with the greatest risk existing in those who both had PTSD and had been POWs. ([Alzheimer's & Dementia](#), June 2014)

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.



VA research on **ARTHRITIS**

Arthritis affects 53.5 million American adults, one in every five. According to the Centers for Disease Control and Prevention, it is the nation's most common cause of disability.

ABOUT ARTHRITIS

- Arthritis refers to joint inflammation from a number of causes. The term is used to describe more than 100 rheumatic diseases and conditions that affect joints, the tissues that surround the joint, and other connective tissue.
- Typically, pain and stiffness in and around one of the joints characterize rheumatic conditions. The symptoms can develop gradually or suddenly. Certain rheumatic conditions can also involve the immune system and various internal organs of the body.
- Osteoarthritis, or degenerative joint disease, is the most common form of arthritis, affecting up to 27 million Americans.
- Rheumatoid arthritis affects about 1.3 million Americans. In this disease, the body's immune system attacks its own joint tissue, causing inflammation. It can result in the destruction of cartilage and bone.

VA RESEARCH ON ARTHRITIS: OVERVIEW

- VA researchers are developing new clinical treatments that reduce Veterans' disabilities and improve the ability of VA

clinicians to provide effective care for patients with arthritis.

- Some groups are identifying molecular mechanisms that affect skeletal health and can lead to new treatments for osteoarthritis. Others are using innovative techniques to design therapeutic interventions, from surgical techniques to physical therapy, for patients who have lost mobility or functioning. Still others hope to halt the progression of osteoarthritis, and to reverse the degeneration of cartilage associated with the disease.
- VA studies are exploring less expensive drug treatments for arthritis. Others are examining possible causes of arthritis, such as immune system changes and a possible link to PTSD.
- VA researchers are exploring complementary and integrative treatments, including nutritional supplements, massage, and activity pacing, to manage pain caused by arthritis.

SELECTED MILESTONES AND MAJOR EVENTS

- 2002** – Established the [Rheumatoid Arthritis Registry](#), providing researchers

with access to information about hundreds of male patients with rheumatoid arthritis

- 2006** – [Found](#) little overall benefit in two widely used nutritional supplements for arthritis (glucosamine and chondroitin sulfate)

- 2011** – [Learned](#) that the complement system, a group of proteins that move freely through the blood stream, plays an important role in the development and spread of osteoarthritis

- 2014** – Received the [Lee C. Howley Sr. Prize](#) for Arthritis Scientific Research (VA Boston Health Care System and others) for determining that less expensive anti-rheumatic drugs worked as well as newer, more expensive, biological treatments

- 2014** – [Tested](#) an anti-inflammatory drug on mice that may someday have the effect of reversing bone loss in patients with RA

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Group and individual physical therapy are equally effective** for patients with knee osteoarthritis, found a study conducted at the Durham VA Medical Center in North Carolina. The researchers say both approaches are reasonable

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treatment options, and the group setting may have extra benefits such as cost-effectiveness and social support. ([Physical Therapy](#), May 2016)

• **Men with rheumatoid arthritis showed higher rates of mortality** than age-matched men without the disease, according to researchers from multiple VA health care systems. These men had a three-fold risk of respiratory-related deaths compared to men without rheumatoid arthritis. ([Arthritis Care & Research](#), Dec. 21, 2015)

• **Swedish massage may be effective for reducing pain** in patients with knee osteoarthritis, according to investigators with the Durham VA Medical Center and their colleagues. Their pilot study showed that Swedish massage is a feasible and acceptable treatment for VA health care users, and they suggest a larger, randomized trial to further explore its possible benefits. ([Journal of Alternative and Complementary Medicine](#), June 1, 2015)

• **Trauma exposure and PTSD may increase the risk of autoimmune disorders** such as rheumatoid arthritis, according to researchers at the San Francisco VA Medical Center. PTSD is associated with endocrine and immune abnormalities, and this study showed that Veterans with PTSD were at a significantly higher relative risk than Veterans without the condition. ([Biological Psychiatry](#), Feb. 15, 2015)

• **An anti-inflammatory drug that blocks a specific receptor of T cells** may halt or even reverse bone loss related to rheumatoid arthritis. This Atlanta VA Medical Center study found that the tested drug promoted bone formation and density in mice. ([Arthritis & Rheumatology](#), April 1, 2014)

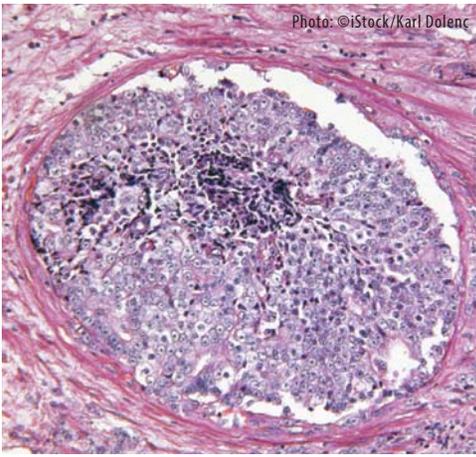
• **Ann Arbor VA researchers are conducting a trial** that tests activity pacing in people with osteoarthritis, with funding from the National Institutes of Health. Activity pacing is a strategy that involves planning rest

breaks during the day, which helps to avoid arthritis flare-ups. A pilot study has indicated that tailored activity pacing reduces fatigue and makes daily activity easier. ([National Institutes of Health](#))

• **Less expensive combinations of disease-modifying anti-rheumatic drugs** produce the same clinical benefits for patients with rheumatoid arthritis as much more expensive biological treatment in a study conducted by the Omaha VA Medical Center and the University of Nebraska. The study included 353 patients at 16 VA medical centers, 12 rheumatoid arthritis investigational network sites, and eight Canadian medical centers. ([New England Journal of Medicine](#), July 25, 2013)

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

Arthritis refers to joint inflammation from a number of causes. The term is used to describe more than 100 rheumatic diseases and conditions that affect joints, the tissues that surround the joint, and other connective tissue.



VA research on CANCER

Cancer is a general term that includes more than 200 different diseases. In all forms of cancer, cells in the body grow and multiply abnormally, eventually taking over and destroying normal tissue.

ABOUT CANCER

- The main types of cancer are leukemias and lymphomas, involving the blood and related tissues; carcinomas, which occur in the skin, glands, and certain organs; and sarcomas, which involve muscles and connective tissues.
- Around 40,000 cancer cases are reported to VA's Central Cancer Registry annually, about 3 percent of all cancers in the United States.
- The five most frequently diagnosed cancers among VA cancer patients were prostate, lung and bronchial, colorectal, urinary and bladder cancers, and skin melanomas. This list is similar to that for American men as a whole.
- Colon cancer can be cured if diagnosed early, yet one-third of patients who develop colon cancer will die from the disease.

VA RESEARCH ON CANCER: OVERVIEW

- VA researchers conduct laboratory experiments aimed at discovering the molecular and genetic mechanisms involved in cancer; studies looking at the causes of disease; clinical trials to evaluate new or existing treatments; and studies focused on improving end-of-life care.

- VA researchers are finding ways to maintain good health and enhance the quality of life of the increasing number of cancer survivors.
- While most of the patients VA treats are male, the department is seeing increasing numbers of women Veterans. VA researchers are therefore looking closely at breast cancer, its causes, and treatments for the disease.
- VA studies are examining many topics related to cancer, including the possible risks of e-cigarettes, the link between Agent Orange exposure and prostate cancer, and gene therapy to halt the growth of tumor cells.
- VA and DoD are working on a program to tailor cancer care for patients based on the genes and proteins associated with their tumors. By using genomics, clinicians can provide individualized care based on patients' specific biology.

SELECTED MILESTONES AND MAJOR EVENTS

- 1932** - [Established](#) a tumor research laboratory in Hines, Ill.—the first VA research laboratory to receive funding specifically for research
- 1950** - Concluded, in a [paper](#) by Dr. Robert Schrek of Hines, there is "strong

circumstantial evidence" linking cigarette smoking with respiratory tract cancers

- 1956** - [Linked](#) cigarette smoking with precancerous lesions
- 1984** - [Developed](#) a transdermal nicotine patch to reduce the cravings for cigarettes
- 2000** - [Showed](#) the superiority of colonoscopy to sigmoidoscopy
- 2012** - [Demonstrated](#) that observation is as effective as surgery in treating early-stage prostate cancer
- 2015** - [Joined](#) with gastroenterologists from throughout the United States, Canada, and the United Kingdom to develop a new set of recommendations on the surveillance and management of areas of pre-cancerous cells in patients with inflammatory bowel disease
- 2016** - [Formed](#) the Applied Proteogenomics Organizational Learning and Outcomes (APOLLO) consortium, with the Department of Defense and National Cancer Institute, to tailor cancer care based on individual gene and protein information

RECENT STUDIES: SELECTED HIGHLIGHTS

- **E-cigarettes may be toxic to airway cells**, suppress host defenses, and promote inflammation over time, found a VA San

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Diego Healthcare System study in mice. E-cigarette vapor exposure also led to more damage from bacteria in the throat. ([Journal of Molecular Medicine](#), Jan. 25, 2016)

• **Early lung cancer screenings can actually lower smokers' motivation to quit smoking**, according to researchers with the Center of Innovation for Veteran-Centered and Value-Driven Care. Many patients believed that undergoing the screening process meant they did not need to quit. The researchers recommend that clinicians address misconceptions about lung cancer screenings with patients. ([JAMA Internal Medicine](#), September 2015)

• **Longer-lasting colonoscopies are associated with lower cancer rates**, according to researchers with the Minneapolis VA Health Care System and the University of Minnesota. Patients who had been examined by doctors with withdrawal times shorter than six minutes, on average, were more likely to have cancer. ([Gastroenterology](#), October 2015)

• **Patients who received radiation therapy for testicular cancer** were six times more likely to develop stomach cancer, according to an international study including researchers from the Oklahoma City VA Medical Center. The study further found that those who had received very high doses of radiation were at nearly 20 times the risk. ([British Journal of Cancer](#), Jan. 6, 2015)

• **Honokiol, an extract from magnolia tree bark, blocks a protein** called epidermal growth factor receptor (EGFR), found researchers with VA and the University of Alabama at Birmingham. EGFR is associated with squamous cell cancers of the head and neck. In the study, honokiol shut down cancer-cell growth in animal models. ([Oncotarget](#), Aug. 28, 2015)

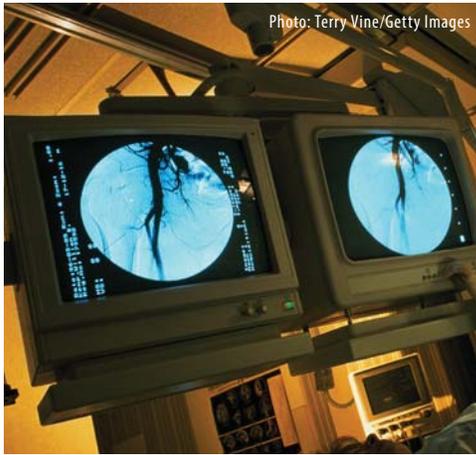
• **Low-dose aspirin can impair the ability of breast cancer cells to renew themselves**, found a Kansas City (Mo.) VA Medical Center study involving mice. A daily dose of aspirin almost halved tumor growth by altering the molecular signature in breast cancer cells. ([Laboratory Investigation](#), July 2015)

• **Gene therapy could halt the growth of prostate tumors**, according to Kansas City (Mo.) VA Medical Center researchers. A combination of genes for prostate-specific antigen and prostate stem cell antigen seemed to stop prostate tumors from growing in mice by promoting the production of T cells that attacked tumor cells. ([Immunotherapy](#), June 2011)

• **Multitarget stool DNA testing is significantly more sensitive** at detecting colorectal cancer and precancerous lesions than a fecal immunochemical test, according to a team led by researchers at the Center for Innovation at Roudebush Veterans Affairs Medical Center in Indianapolis. However, multitarget stool DNA testing gives more false positives than fecal immunochemical testing. ([New England Journal of Medicine](#), April 3, 2014)

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

Among other goals, VA researchers are finding ways to maintain good health and enhance the quality of life of the increasing number of cancer survivors.



VA research on **CARDIOVASCULAR DISEASE**

Cardiovascular disease refers to conditions that affect the heart or blood vessels. It describes conditions ranging from peripheral artery disease and high blood pressure to heart attacks and strokes.

ABOUT CARDIOVASCULAR DISEASE

• Cardiovascular disease is the number-one killer of Americans, and is the leading cause of hospitalization in the VA health care system. It is also a major cause of disability.

• Cardiovascular disease is particularly important to Veterans because it is associated with a number of other diseases that often affect them. These include diabetes, spinal cord injuries, and posttraumatic stress disorder.

• Although there are many different forms of cardiovascular disease, one of the most common forms is a narrowing or a blocking of the blood vessels that supply blood to the heart. This is called coronary artery disease (CAD), and is the main reason people have heart attacks.

VA RESEARCH ON CARDIOVASCULAR DISEASE: OVERVIEW

• A VA study [conducted](#) in the 1960s generated the first definitive evidence that treating moderate high blood pressure helps prevent and delay the complications hypertension can bring. These

complications can include heart disease, kidney disease, stroke, and CAD.

• VA researchers are developing new treatments for cardiovascular disease and helping to improve existing treatments. They are looking at the genetic and lifestyle causes of the disease and are conducting studies ranging from lab experiments to large clinical trials involving thousands of patients.

• VA is also making Veterans and their families aware of the risk factors for cardiovascular disease. Besides high blood pressure, these include smoking, high cholesterol, obesity, lack of physical activity, and uncontrolled diabetes.

• The department offers a number of evidence-based programs to help Veterans manage these conditions. VA researchers review these programs, evaluate their effectiveness, and make suggestions for improvements.

SELECTED MILESTONES AND MAJOR EVENTS

1960 – [Successfully implanted](#) the first cardiac pacemaker, a device developed by a VA team

1970 – [Published](#) the results of a landmark VA cooperative study on hypertension, showing that treating moderate high blood pressure prevented or delayed catastrophic health complications

1996 – Developed [clinical practice guidelines](#) on cholesterol screening for the American College of Physicians

2007 – [Learned](#) that balloon angioplasty and stenting do little to improve outcomes for patients with stable coronary artery disease who also receive optimal drug therapy and undergo lifestyle changes

2015 – [Participated](#) in the [Systolic Blood Pressure Intervention Trial](#) (SPRINT), which found that significantly lowered systolic blood pressure reduces the rate of heart and kidney diseases, stroke, and age-related declines in people over 65

RECENT STUDIES: SELECTED HIGHLIGHTS

• **Patients who were assigned to reach a systolic blood pressure goal below 120, far lower than current guidelines of 140 (or 150 for people over 60), had their risks of heart attacks, heart failure, and strokes reduced by a third, and their risk of death reduced by a quarter, according**

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to a study led in part by a researcher from the Memphis VA Medical Center. ([New England Journal of Medicine](#), Nov. 28, 2015)

• Older men treated within the VA health care system for acute myocardial infarctions (heart attacks) are less likely to die within 30 days after the event than Medicare beneficiaries treated at other hospitals, although they are more likely to require readmission during the same time period. Mortality rates and readmission rates were higher at VA hospitals, however, for pneumonia. ([Journal of the American Medical Association](#), Feb. 9, 2016)

• Veterans with posttraumatic stress disorder (PTSD) are more likely to have reduced blood flow to the heart, or ischemia. After statistical adjustments for factors known to influence heart disease, PTSD was associated with more than double the risk for ischemia—and the more severe the PTSD symptoms were, the greater the risk. ([Biological Psychiatry](#), Dec. 1, 2013)

• Women Veterans who underwent cardiac catheterization tended to be younger and more obese than men, and were more likely to have PTSD or depression. They were also significantly less likely to have obstructive coronary disease, and consequently were less likely to have been prescribed heart medications. However, their long-term health outcomes were about the same as those of their male counterparts, according to researchers with VA and the University of California, San Francisco. ([Circulation: Cardiovascular Quality and Outcomes](#), March 2015)

• Intensive glucose control in patients whose type 2 diabetes had previously been poorly controlled had no significant effect on the rates of major cardiovascular events such as coronary artery disease and stroke, compared with those who were treated with standard glucose-control measures. This 2009 finding by the VA Diabetes Trial was followed up on in 2015 with a finding that patients who had been in the study’s intensive-control group had a lower incidence of cardiovascular events after the trial was

over, but their survival rates were no better than those who were not in that group. ([New England Journal of Medicine](#), June 4, 2015; earlier study in [New England Journal of Medicine](#), Jan. 8, 2009)

• Serious hypoglycemia may be associated with the progression of atherosclerosis, according to VA Diabetes Trial researchers. Atherosclerosis is a common form of arteriosclerosis in which fatty substances form a deposit of plaque on the inner lining of arterial walls. This can restrict blood flow, and the plaques can burst, triggering a blood clot. ([Diabetes Care](#), Mar. 2016)

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

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VA research on **CAREGIVERS**

Providing quality care to America's Veterans doesn't end with the Veteran himself or herself. It extends to the family member or loved one who tends to the everyday needs of a disabled, chronically ill, or aging Veteran: the caregiver.

ABOUT CAREGIVERS

- Increasingly, America is becoming a nation of caregivers. According to a 2015 report from AARP, an estimated 43.5 million adults in the United States provided unpaid care to an adult or a child in the prior 12 months.
- Whether supervising a spouse to help keep him or her from wandering, assisting with activities of daily living, helping to develop and implement treatment plans, or managing a loved one's behavioral symptoms, caregivers face multiple demands on their time and emotional and physical energy, and as a result may be at risk for becoming anxious, depressed, or susceptible to chronic illness themselves.
- In 2010, legislation authorized VA to establish a wide range of new services to support certain caregivers of eligible Veterans who served after Sept. 11, 2001. These caregivers are now entitled to access to a toll-free caregiver support line (1-855-260-3274), expanded education and training on caring for Veterans at home, and other support services such as counseling and support groups.
- VA facilities also offer programs including in-home care; specialized education and training; respite care; equipment, home,

and automobile modification; and financial assistance for eligible Veterans. Every VA medical center has a caregiver support coordinator to help link up caregivers and Veterans with available VA and non-VA support resources.

VA RESEARCH ON CAREGIVERS: OVERVIEW

- VA experts are developing and refining questionnaires and survey tools, as well as cross-cutting strategies that can be used to implement and test programs across a wide variety of caregiving situations.
- Several VA studies are looking at the impact of caregiver education and stress-reduction programs on the health and wellness of both the Veteran and the caregiver. Other studies are focusing on both the short- and long-term needs of caregivers, as many of these individuals will be providing care for years or even decades.
- VA investigators are continuing to improve their understanding of the care caregivers provide and the support they need. They also are learning how caregiving has affected the caregiver, the Veteran receiving care, and the Veteran's entire family.

SELECTED MILESTONES AND MAJOR EVENTS

- 2007** – Introduced the [Resources for Enhancing Alzheimer's Caregiver Health](#) (REACH VA) program to reduce stress on caregivers for Veterans with Alzheimer's disease
- 2009** – Developed the VA [Family Care map](#), to ensure family members are fully involved in the care of Veterans with polytrauma
- 2010** – Completed VA's [Family and Caregiver Experience](#) (FACES) study, which provided significant information on who provides care to seriously injured Veterans, what kinds of services and support they provide, and what help they need
- 2013** – [Determined](#) that in families using a VA-developed home safety toolkit, there was less caregiver strain, better home safety, and fewer accidents and risky behaviors among those with Alzheimer's
- 2015** – [Found](#) that the blame and anger associated with the grief of caring for a loved one with a traumatic brain injury (TBI) may be related to inflammation and certain chronic diseases including heart disease, cancer, and diabetes

(Continued on back)



RECENT STUDIES: SELECTED HIGHLIGHTS

- **According to VA's FACES study, 79 percent of caregivers for Veterans with multiple injuries (polytraumas) are women**, usually the Veteran's parent or spouse. Even as long as four years after their injury, 22 percent of Veterans with polytraumas supported by caregivers still need help with basic activities and daily living such as bathing, feeding, and toileting. An additional 48 percent need help with tasks such as shopping, driving, and money management, according to Minneapolis VA researchers. ([Family and Caregiver Experience Study](#))
- **Financial strain is common for caregivers.** Among caregivers of Veterans with polytrauma, 62 percent reported to Minneapolis VA researchers that their assets had been depleted and 41 percent reported having to leave the labor force. These figures are much higher than those for other caregivers internationally. ([Journal of Head Trauma Rehabilitation](#), January-February 2012)
- **A safety toolkit that provides research-based recommendations for home safety has been created** by researchers at the Bedford, Mass., VA hospital and Boston University. Families

who used the 25-page, illustrated, simple-language guide to help them care for Veterans with Alzheimer's disease had less caregiver strain, better home safety, and fewer accidents and risky behaviors than families whose loved one received usual care. ([International Journal of Alzheimer's Disease](#), 2013)

- **Caregivers who have not been trained on how to navigate health care systems have higher levels of depression**, feel more burdened by their responsibilities, and have lower self-esteem than those who had been trained in this skill. Researchers at the Richmond and Minneapolis VA Medical Centers also found caregivers who had not been trained in how to support the emotions of their care recipients now have higher levels of anxiety, depression, and care burden, and lower self-esteem than those who received such training. ([Behavioral Neurology](#), 2015)
- **Systematized feedback to caregivers could alleviate their burden and help them avoid burnout and mental health concerns.** In a study by researchers from the Ann Arbor VA and the University of Michigan involving 369 Veterans with heart failure, those caregivers who

received feedback about their loved one reported less caregiver strain and depression than in the control group. They also reported they had spent more time with their patients, including greater attendance at doctors' appointments; increased involvement in patient medication adherence; and more time spent in supportive care. ([Medical Care](#), August 2015)

- **Blame and anger associated with the grief of caring for a loved one with a TBI may be related to inflammation and certain chronic diseases**, including heart disease, cancer, and diabetes. A study by researchers at the Hines, Ill., VA hospital and Loyola University of Chicago found these caregivers collectively reported levels of grief comparable to that of individuals who have lost a loved one. Inflammatory-related health issues may be an important indicator of which caregivers may be at risk for developing chronic problems such as heart disease. ([Biological Research for Nursing](#), January 2016)

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

VA experts are developing and evaluating programs and interventions across a wide range of caregiving situations.

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Photo: David Joel/Getty Images



VA research on

COMPLEMENTARY AND INTEGRATIVE HEALTH (CIH)

Complementary and integrative health generally consists of products and practices that are not currently part of “mainstream” medicine. The field emphasizes patient empowerment, preventive self-care, and wellness, in place of a reliance on medical treatment and intervention.

ABOUT CIH

- More than 30 percent of American adults and about 12 percent of children use health care approaches developed outside of mainstream conventional medicine, according to the [National Center for Complementary and Integrative Health](#).
- Complementary health is used along with standard medical care, while alternative medicine is used in place of standard care. Integrative health refers to care that blends both mainstream and alternative practices.
- Most complementary health approaches fall into one of two subgroups: natural products, which include herbs, vitamins and minerals, and probiotics; and mind and body practices such as yoga, meditation, massage therapy, acupuncture, and relaxation techniques.
- In VA, CIH techniques are most commonly used to help Veterans manage stress, or to promote wellness.
- CIH is often used to treat PTSD, depression, back pain, headache, arthritis, fibromyalgia (which involves chronic pain and fatigue throughout the body), and substance abuse.

VA RESEARCH ON CIH: OVERVIEW

- Many CIH practices have not been rigorously tested in formal research. VA researchers are conducting studies to determine which therapies are safe and effective, and for which conditions and populations they work best.
- VA has conducted several studies on integrative mental health treatments. They address topics such as meditation to treat PTSD and other mental health conditions; vitamin E to delay the decline of cognitive functioning in Alzheimer’s disease; and transcranial magnetic stimulation to treat depression, migraines, and tinnitus.
- VA researchers are exploring integrative cancer treatments such as extract from magnolia tree bark, antioxidants in fruits, and compounds in the spice turmeric. These natural compounds show potential to block cancer growth.
- Other complementary and integrative approaches being explored by VA include exercise for physical and mental health, maggot therapy to clean wounds, and fecal transplants to resolve *C. difficile* infections.

SELECTED MILESTONES AND MAJOR EVENTS

- 2006** – [Learned](#) that glucosamine and chondroitin sulfate, taken either alone or in combination, do not reduce pain effectively in patients with osteoarthritis of the knee
- 2011** – [Reported](#) that 90 percent of VA facilities offered complementary or integrative medicine therapies, or referred Veterans to licensed practitioners
- 2014** – [Found](#) that vitamin E, an inexpensive treatment, can significantly delay functional decline among patients with mild to moderate Alzheimer’s disease
- 2015** – [Learned](#) that mindfulness therapy may be more effective than standard group therapy in treating PTSD

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Veterans who used “mantram” meditation had improved outcomes** for anxiety, depression, and somatization (psychological distress expressed through physical symptoms), according to a study at six VA sites. Mantram meditation involves silently repeating a word or

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phrase that holds personal meaning to the user. ([Complementary Therapies in Clinical Practice](#), February 2016)

- **Online expressive-writing sessions helped Veterans reintegrate into society**, according to a study led by researchers from the Minneapolis VA Health Care System. The study showed that expressive writing was better than no writing at reducing PTSD symptoms, anger, distress, reintegration problems, and physical complaints. ([Journal of Traumatic Stress](#), October 2015)

- **A procedure called fecal transplantation, which dates back thousands of years**, can effectively battle C. difficile infections, according to a systematic review by VA and University of Minnesota researchers. This procedure involves inserting stool containing healthy bacteria into sick patients to combat the infection. ([Annals of Internal Medicine](#), May 5, 2015)

- **Repetitive transcranial magnetic stimulation** decreases persistent daily headache pain in Veterans with mild traumatic brain injury, according to a study at the VA San Diego Healthcare

System. Researchers found that transcranial magnetic stimulation resulted in more than 50 percent headache intensity reduction one week after treatment. Headache is one of the most common chronic pain conditions in active duty personnel and Veterans with mild traumatic brain injury. ([Neuromodulation](#), Nov. 10, 2015)

- **Ginger nanoparticles may soothe inflammatory bowel disease**, according to researchers with VA and the Institute for Biomedical Sciences at Georgia State University. They have developed “edible ginger-derived nanoparticles” that they believe may be good medicine for Crohn’s disease and ulcerative colitis, the two main forms of inflammatory bowel disease. The particles may also help fight cancer linked to colitis, according to experiments in mice. ([Biomaterials](#), September 2016)

- **Grape seed proanthocyanidins could stop skin cancer cell migration**, according to another study based at VA and the University of Alabama at Birmingham. This compound in grape

seeds could lead to new ways to stop skin cancer from spreading, say the researchers. ([American Journal of Cancer Research](#), Oct. 15, 2015)

- **Mindfulness-based stress reduction therapy** results in a greater decrease in PTSD symptom severity for Veterans than standard group therapy, according to researchers with the Minneapolis VA Health Care System. This type of therapy focuses on teaching patients to attend to the present moment in a nonjudgmental, accepting manner. ([JAMA](#), Aug. 4, 2015)

- **Taking supplemental vitamin E may slow functional decline in patients with mild to moderate Alzheimer’s disease**, found a multicenter VA research team. The study showed that the vitamin added, on average, six months of better cognitive functions for patients with this progressive disease. ([JAMA](#), Jan 1, 2014)

For more information on VA studies on complementary and integrative health, and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

VA researchers are conducting studies to determine which complementary and integrative therapies are safe and effective, and for which conditions and populations they work best.

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VA research on **DEPRESSION**

Depression causes sadness, loss of interest in activities people once enjoyed, withdrawal from others, and low energy. Depression can also cause people to feel hopeless about the future and even think about suicide.

ABOUT DEPRESSION

- According to the National Institute of Mental Health (NIMH), major depression is one of the most common mental disorders in the United States, and it carries the heaviest burden of disability among mental and behavioral disorders. In 2014, NIMH [estimated](#) that some 15.7 million adults aged 18 or older in the United States had at least one major depressive episode in the past year—6.7 percent of all U.S. adults.

- Most experts believe a combination of genes and stressful life events can cause depression. Health problems such as anemia or an underactive thyroid gland can also lead to depression, as can certain medicines, such as steroids or narcotics.

- In 2008, VA [estimated](#) that about 1 in 3 Veterans visiting primary care clinics has some symptoms of depression; 1 in 5 has serious symptoms that suggest the need for further evaluation for major depression; and 1 in 8 to 10 has major depression, requiring treatment with psychotherapy or antidepressants.

VA RESEARCH ON DEPRESSION: OVERVIEW

- VA researchers are making important headway in treating, screening, and

diagnosing depression and other mood disorders such as bipolar disorder, persistent despondency, and seasonal affective disorder.

- Researchers are developing models of family interventions and social support to help Veterans recover from mood disorders, learning which risk factors make a person more likely to suffer from depression or to respond positively to a specific medication, and identifying and testing potential new drugs for depression and other disorders.

SELECTED MILESTONES AND MAJOR EVENTS

2006 – Developed, through VA's [TIDES](#) project, an evidence-based collaborative approach to depression management

2006 – Began the [Heart and Soul Study](#) on how psychological factors influence the outcomes of patients with coronary heart disease

2008 – [Demonstrated](#) that the link between depression and heart disease may hinge largely on behavioral factors associated with depression, such as lack of exercise and increased smoking

2012 – [Found](#) that serotonin and norepinephrine reuptake inhibitors

(SNRIs) may be more effective in treating depression symptoms than drugs that affect only serotonin (SSRIs)

2015 – [Learned](#) that talk therapy delivered by two-way video calls is at least as effective as in-person treatment delivery for older Veterans with depression

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Veterans with depression are more likely to complain of increased chest pain related to ischemic heart disease.**

Ischemic heart disease, also known as coronary artery disease, is the term given to heart problems caused by narrowed heart arteries. Researchers at the VA Puget Sound Health Care System found that changes in depression symptoms could affect the perception of a patient's chest pain, or angina. The greater the perception of chest pain, regardless of the actual extent of the disease, the greater the likelihood of cardiac intervention. ([Annals of Behavioral Medicine](#), February 2015)

- **Veterans with depression, PTSD, and traumatic brain injury have the greatest level of difficulty** in getting around, communicating and getting along with others, self-care, and other daily tasks, according to researchers at VA's Translational Research Center for

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TBI and Stress Disorders. Patients with these conditions have higher levels of disability than those with any other three-diagnosis combination. (*Journal of Traumatic Stress*, February 2015)

• **Women Veterans who undergo cardiac catheterization are more likely to be depressed** or have posttraumatic stress disorder (PTSD) than women who did not. They also tend to be younger and more obese than men and are also significantly less likely to have obstructive coronary disease, according to researchers with the VA Ann Arbor Healthcare System and the University of Michigan. Consequently, they were less likely to have been prescribed heart medications. However, their long-term health outcomes were about the same as those of their male counterparts. (*Circulation: Cardiovascular Quality and Outcomes*, March 2015)

• **Talk therapy delivered by two-way video calls is at least as effective as in-person treatment delivery for older Veterans with depression.** A study led by researchers from VA's Health Equity

and Rural Outreach Center randomly assigned 241 Veterans aged 58 or older with major depression to receive either telemedicine or same-room psychotherapy. Both groups received the same kind of treatment: behavioral activation, a talk therapy that emphasizes reinforcing positive behaviors. The team found that telemedicine-delivered psychotherapy produced similar outcomes to in-person treatment. (*Lancet Psychiatry*, August 2015)

• **Cognitive behavioral therapy (CBT) can help Veterans and others with seasonal affective disorder (SAD).** CBT is a form of psychotherapy that focuses on the integral relationship between people's thoughts and their behaviors. SAD is a form of clinical depression that occurs in fall and winter and is more highly prevalent in those who live in northern climates. In a study by researchers from VA's Baltimore and Denver Mental Illness Research Education and Clinical Centers (MIRECCs), along with researchers from several universities, patients focused on behaviors that would help them cope

with winter and were encouraged to engage in fun activities to counteract their avoidance mechanisms. (*American Journal of Psychiatry*, Sept. 1, 2015)

• **Depression may be the cause of poor health behaviors, not its consequence,** according to a study led by VA and University of California, San Francisco researchers. The team found that depressive symptoms were linked to a range of lifestyle risk factors among 667 patients with coronary heart disease. These included smoking, low levels of physical activity, poor sleep quality, and poor mental activities. Each of these lifestyle factors got worse over a five-year period in depressed individuals, more so than in those who had cardiovascular disease but few, if any, symptoms of depression. (*Annals of Behavioral Medicine*, August 2016)

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

Major depression is one of the most common mental disorders in the U.S., and it carries the heaviest burden of disability among mental and behavioral disorders.



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VA research on **DIABETES**

More than 29 million Americans have diabetes, and 86 million more are at risk to develop the disease. Many Veterans have the disease, including some who developed it as a result of being exposed to herbicides while serving in Vietnam.

ABOUT DIABETES

- Diabetes is a chronic disease in which the body cannot produce or properly use insulin, which the body needs to bring sugar out of the bloodstream and into cells. As a result of high blood sugar levels, damage eventually occurs to blood vessels and organs.
- Symptoms of diabetes include blurry vision, excessive thirst, fatigue, frequent urination, hunger, and weight loss. Persons with diabetes need to have their hemoglobin average blood glucose levels checked every three to six months.
- There are three major types of diabetes. In type 1 diabetes, the body makes little or no insulin, so daily injections of insulin are needed. It is usually diagnosed in childhood. Type 2 diabetes usually occurs in adults. In type 2 diabetes, the pancreas does not make enough insulin to keep blood glucose levels normal, often because the body does not respond well to insulin. The third type of diabetes is gestational diabetes, high blood glucose that develops during pregnancy in women who do not have diabetes.
- More than 90 percent of adults with diabetes have type 2 diabetes. More are at risk due to overweight or obesity.
- Diabetes affects nearly [25 percent](#) of

VA's patient population. The disease is the leading cause of blindness, end-stage renal disease, and amputation for VA patients.

VA RESEARCH ON DIABETES: OVERVIEW

- VA researchers are studying innovative strategies and technologies, including group visits, telemedicine, peer counseling, and Internet-based education and case management, to enhance access to diabetes care and improve outcomes for patients.
- VA researchers are working to develop better ways to prevent and treat diabetes, especially in special populations such as the elderly, amputees, minorities, spinal cord-injured patients, and those with kidney or heart disease.
- VA investigators conducted the VA Diabetes Trial, a multiyear study examining the relationship between glucose control in diabetics and cardiovascular health. The seven-year study included nearly 1,800 patients with diabetes. VA continues to conduct follow-up studies based on the original trial.
- VA researchers are using data from other large studies, such as the VA-DoD Millennium Cohort Study, to examine predictors of diabetes in service members and Veterans. They have found links

between diabetes and sleep apnea, poor sleep quality, statin use, and obesity.

- [Dr. Andrew V. Schally](#), a Nobel Prize winner and VA researcher, is leading a team studying growth hormone-releasing hormone agonists' ability to promote the growth and function of pancreatic islet cells. These new agonists—drugs that act like other substances and therefore stimulate an action in the body—may provide an improved approach to treating diabetes by stimulating the body to release insulin.

SELECTED MILESTONES AND MAJOR EVENTS

- 1977** – Received the Nobel Prize in physiology or medicine ([Rosalyn Yalow, PhD](#)), for developing a new way to measure insulin and other hormones in the blood
- 1998** – Discovered that an [implantable insulin pump](#) offers better blood sugar control, weight control, and quality of life for adult than multiple daily injections
- 2009** – Determined, through the [VA Diabetes Trial](#), that intensively controlling blood sugar reduces the risks of heart disease only modestly
- 2013** – Documented the link between low blood sugar and dementia in older adults

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2013 – Found, in the VA-Department of Defense [Millennium Cohort Study](#), that sleep apnea and poor sleep quality predict diabetes, independent of other diabetes risk factors or mental health

2013 – Began participation in a National Institutes of Health (NIH) [study](#) testing the long-term benefits and risks of four widely used diabetes drugs in combination with metformin

2015 – Learned, in a [follow-up](#) to the VA Diabetes Trial, that 10 years after the trial's conclusion, patients who had intensively controlled their blood sugar levels during the trial had no better survival rates than those who did not

RECENT STUDIES: SELECTED HIGHLIGHTS

• **Clinicians should consider reducing the dosage** of blood pressure- and blood glucose-lowering medicine in older patients with diabetes when blood pressure and glucose levels are low, found researchers with the VA Center for Clinical Management Research in Ann Arbor, Mich. Study data shows that medication is rarely de-intensified for these patients, which the researchers called a lost opportunity to reduce overtreatment. ([JAMA Internal Medicine](#), December 2015)

• **Diabetes, diabetic complications, and overweight/obesity** were more commonly diagnosed among statin users than similar nonusers, according to researchers at the VA North Texas Health Care System and University of Texas. Statins are commonly prescribed to treat high cholesterol, but this study demonstrates that short-term clinical trials might not fully describe the risks and benefits of long-term statin use. ([Journal of General Internal Medicine](#), November 2015)

• **A comprehensive telemedicine intervention improved outcomes** among Veterans with persistently poor diabetes control. The study, conducted by Durham VA Medical Center and Duke University researchers, found that Veterans in a telemedicine-based diabetes management program had improved outcomes over those who received only clinic care. ([Telemedicine Journal of e-Health](#), April 29, 2016)

• **Agonists of growth hormone-releasing hormone (GHRH) improved** biological function and insulin production of the pancreas in animal models. This study provides an improved approach to the therapeutic use of GHRH agonists in the treatment of diabetes mellitus, according to researchers from the Endocrine, Polypeptide, and Cancer Institute of the

Miami VA Healthcare System and their associates. ([Proceedings of the National Academy of Sciences](#), Nov. 3, 2015)

• **High blood pressure is associated with worse kidney outcomes** in patients with proteinuric diabetic kidney disease, according to a study based on the VA Nephropathy in Diabetes Trial. Control of blood pressure delays the progression of proteinuric diabetic kidney disease (in which protein leaks from the blood into the urine through the kidneys) to end-stage renal disease, and researchers in this study worked to pinpoint the optimal blood pressure to improve these outcomes. ([Clinical Journal of the American Society of Nephrology](#), Dec. 7, 2015)

• **After nearly 10 years of follow-up as part of the VA Diabetes Trial**, patients with type 2 diabetes who had been randomly assigned to intensive glucose control for over five years had 8.6 fewer major cardiovascular events per 1,000 person-years than those assigned to standard therapy, but no improvement was seen in the rate of overall survival. ([New England Journal of Medicine](#), June 4, 2015)

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

Diabetes affects nearly 25 percent of VA's patient population. The disease is the leading cause of blindness, end-stage renal disease, and amputation for VA patients.

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VA research on

GASTROINTESTINAL HEALTH

Gastroenterology is a medical specialty that deals with the diagnosis and treatment of disorders of the digestive system. Such disorders may involve the digestive tract, pancreas, liver, or gallbladder.

ABOUT GASTROINTESTINAL HEALTH

- Gastrointestinal problems are among the illnesses reported by many Gulf War Veterans. These problems include irritable bowel syndrome, which is marked by chronic cramping, bloating, and diarrhea.
- More than 1 million Americans have inflammatory bowel disease, which includes Crohn's disease and ulcerative colitis. Crohn's disease affects the entire gastrointestinal tract, while ulcerative colitis is limited to the colon.
- Frequent heartburn, or gastroesophageal reflux disease (GERD), is a common gastrointestinal issue. About one in 10 Americans experiences GERD symptoms at least once a week.
- Colorectal cancer is the third most common cancer in the United States.

VA RESEARCH ON GASTROINTESTINAL HEALTH: OVERVIEW

- VA researchers are exploring new techniques to treat *Clostridium difficile* (*C. difficile*) infections, such as doses of non-toxic *C. difficile* spores and fecal transplantation. *C. difficile* is often resistant to standard treatments such as antibiotics.

- Researchers from three VA sites developed new guidelines for screening and managing precancerous cells that could develop into colon cancer in patients with inflammatory bowel disease.
- VA has made it a priority to screen its patients aged 50 years or older for colon cancer. Evidence from the American Cancer Society suggests that screening efforts have helped lower the number of deaths from colon cancer in recent years.
- VA researchers are looking for potential drug therapies to help Veterans with gastrointestinal problems such as stomach ulcers, *C. difficile* infections, irritable bowel syndrome, inflammatory bowel disease, colon cancer, and GERD. They are also exploring less invasive treatments and seeking supportive strategies for Veterans during and after treatment.

SELECTED MILESTONES AND MAJOR EVENTS

- 1950s** – Greatly expanded, through the work of [Dr. Morton I. Grossman](#), the understanding of the physiology and regulation of gastrointestinal secretions
- 1977** – Received the Nobel Prize in physiology or medicine ([Dr. Rosalyn Yalow](#)), for developing a new way to measure insulin and other hormones in the blood

2004 – [Found](#) that the open technique is superior to the laparoscopic technique for mesh repair of primary hernias

2013 – [Learned](#) that treatment with the drug infliximab and an immunomodulator significantly reduces the risk of hospitalization and surgery

2013 – [Determined](#) that weight is not a factor in whether proton-pump inhibitors can successfully treat gastroesophageal reflux disease

2015 – [Found](#) that giving spores of non-toxic *C. difficile* by mouth can stop repeated bouts of infection

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Giving spores of non-toxic *C. difficile* by mouth** can stop repeated bouts of *C. difficile* infection, found an international team of researchers led by Dr. Dale Gerding of the Edward Hines, Jr. VA Hospital. *C. difficile* is an intestinal bacterial infection that is often difficult to treat and frequently reoccurs. ([Journal of the American Medical Association](#), May 5, 2015)
- **A procedure called fecal transplantation, which may date back thousands of years**, can effectively battle *C. difficile* infections, according to a systematic review by VA and University of

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Minnesota researchers. This procedure involves inserting stool containing healthy bacteria into sick patients to combat the infection. ([Annals of Internal Medicine](#), May 5, 2015)

• **Taking the drug infliximab (sold as Remicade) together with an immunomodulator** significantly reduces the risk of hospitalization and surgery after one year in men with inflammatory bowel disease, found researchers from the Michael DeBakey VA Medical Center in Houston and Baylor College of Medicine. ([Clinical Gastroenterology and Hepatology](#), October 2013)

• **A study of more than 666,000 Veterans of Iraq and Afghanistan** showed that those with PTSD were more likely to have autoimmune disorders such as inflammatory bowel disease. The study was led by researchers at the San Francisco VA Medical Center. ([Biological Psychiatry](#), Feb 15, 2015)

• **About 1 in 10 Americans experiences GERD symptoms at least once a week.** People who are obese

are more likely to have GERD. A study of patients treated at the Kansas City, Mo., VA Medical Center and the University of Kansas showed that weight was not a factor in the success of the strongest treatment available for frequent heartburn, the proton-pump inhibitor esomeprazole. ([Journal of Clinical Gastroenterology](#), September 2013)

• **Current antibiotic therapies to treat H. pylori bacteria**—a major cause of ulcers—may be obsolete, because the bug is now resistant to many common antibiotics. VA's Dr. David Graham and two non-VA colleagues suggest that improving counseling and education for patients, reviewing the patient's personal history with antibiotics, and taking into account local patterns of antibiotic resistance can boost the effectiveness of antibiotic regimens. ([Clinical Gastroenterology and Hepatology](#), February 2014)

• **A quarter of patients with low-risk benign tumors** received follow-up colonoscopies too early, and more than half of patients with high-risk benign tumors received follow-up

colonoscopies too late or not at all, according to a study by Durham VA and University of North Carolina researchers. System-level improvements are needed so that Veterans receive colonoscopies at the appropriate time, say the researchers. ([Clinical Gastroenterology and Hepatology](#), March 2016)

• **Multi-target stool DNA testing is significantly more sensitive** at detecting colorectal cancer and precancerous lesions than a fecal immunochemical test, according a team led by to researchers at the Center for Innovation at Roudebush Veterans Affairs Medical Center in Indianapolis, Ind. However, multi-target stool DNA testing gives more false positives than fecal immunochemical testing. ([New England Journal of Medicine](#), April 3, 2014)

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

VA researchers are looking for potential drug therapies to help Veterans with gastrointestinal problems, exploring less invasive treatments, and seeking supportive strategies for Veterans during and after treatment.



2011 – [Determined](#) that Veterans known to have been exposed to depleted uranium had no significant evidence of clinically important changes to their bones or kidneys

2012 – Developed the first Gulf War research [strategic plan](#)

2016 – Published [results](#) of the second follow-up survey of Veterans taking part in the longitudinal health study

RECENT STUDIES: SELECTED HIGHLIGHTS

• **Multiple sclerosis is not related to Gulf War deployment**, according to a VA study that compared the clinical and military history of nearly 700,000 deployed and 1.8 million nondeployed personnel. The study also found no correlation between deployment and other diseases that cause deterioration of the myelin sheath that insulates nerves and allows them to function. ([Neuroepidemiology](#), 2014)

• **Gulf War Veterans whose sleep quality was poor had reduced gray matter volume in their brains**, according to a study by researchers at the San Francisco VA Health Care

System and the University of California. Gray matter is made up of neurons, the most important type of brain cell. The study does not necessarily prove that poor sleep causes reduced volume, however, and it is also unclear what impact treating poor sleep has on the brain. ([Sleep](#), March 1, 2014)

• **The composition of Human Leukocyte Antigen (HLA), a protein found in most cells in the body, is different in Veterans with CMI** than in those without the illness. Researchers from the Minneapolis VA and the University of Minnesota concluded that Veterans with CMI had reduced levels of protection from HLA, which regulates the immune system in humans, and were therefore more susceptible to the illness. ([EBioMedicine](#), Nov. 22, 2015)

• **More than 20 years after the Gulf War, Veterans of the war continued to report poorer health than Gulf-era Veterans who were not deployed**, according to the latest results of the Longitudinal Health Study of Gulf War Veterans. Although the prevalence of self-reported health conditions and positive screens of mental health conditions are higher in Gulf War

Veterans, the high rates of these conditions also found in Veterans who did not serve in the Gulf indicates a significant burden of disease in the population of this cohort of Veterans as a whole. This suggests that military service, not solely deployment, has long-term health consequences.

([Journal of Occupational and Environmental Medicine](#), January 2016)

• **A panel of blood markers that can verify a diagnosis of CMI with 90 percent accuracy has been developed** by researchers at the VA Minneapolis Health Care System and the University of Minnesota. Their study found that several commonly used blood tests that indicate inflammation tended to yield different results when given to Veterans who reported symptoms consistent with CMI. The results now need to be validated in larger groups of patients. ([PLoS One](#), June 28, 2016)

For more information on VA studies on Gulf War Veterans and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

More than two decades after the Gulf War, Veterans of the war continued to report poorer health than Gulf-era Veterans who were not deployed.

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2013 – Funded first Collaborative Research to Enhance and Advance Transformation and Excellence ([CREATE](#)) to encourage collaboration among researchers to improve Veterans' health care

2015 – [Published](#), in the Federal Register, a plan to improve access to articles and data prepared by VA researchers while protecting Veterans' data and privacy

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Contamination of the skin and clothing of health care personnel** occurs frequently during removal of contaminated gloves or gowns, according to researchers at the Cleveland VA Medical Center. This contamination can lead to infection risk, and educational interventions are needed for the safety of both patients and health care workers, say the researchers. ([JAMA Internal Medicine](#), December 2015)

- **Telemedicine-based diabetes management improved outcomes** for Veterans with persistently poor diabetes control. A study of 50 Veterans with diabetes, conducted by Durham VA Medical Center and Duke University researchers, found that telemedicine led

to better diabetes management than clinic-based care only. ([Telemedicine Journal and e-Health](#), April 5, 2015)

- **Veterans who used both the VA health care system and a Medicare Advantage plan** had neither better nor worse health outcomes than Veterans who used only VA care, found researchers from several VA medical centers and their colleagues. Many Veterans use non-VA health to supplement their VA care, a practice that this study suggests does not result in fragmented care with poorer outcomes. ([Health Services Research](#), December 2015)

- **VA has developed the “No Preventable Harms” campaign** to reduce occurrences of preventable safety problems such as infections, medication-related errors, and blood clots. An initiative by experts within a seven-hospital Midwestern VA network led to a significant reduction in catheter-associated urinary tract infections in non-intensive care units. Regional collaborations such as this could be a valuable strategy to address important patient safety problems, say the researchers. ([American Journal of Infection Control](#), March 1, 2015)

- **Mobile phones and the Internet could help address the health care needs of homeless Veterans**, according to researchers with the VA Center for Healthcare Organization and Implementation Research in Bedford, Mass. The researchers found that a large percentage of homeless Veterans surveyed had mobile phones and access to the Internet, and nearly all were interested in receiving mobile reminders and outreach about their health care. ([Telemedicine Journal and e-Health](#), Sep. 3, 2014)

- **Diagnostic errors affect at least 1 in 20 U.S. adults**, found researchers with the Houston VA Center for Innovations in Quality, Effectiveness and Safety. The researchers say that this evidence should encourage policymakers, health care organizations, and researchers to make efforts to measure and reduce diagnostic errors. ([BMJ Quality and Safety](#), April 17, 2014)

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

Health services researchers play a vital role in shaping the delivery of health care by studying access, cost, and quality.

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VA research on HEALTH EQUITY

Health care is distributed unevenly in the United States, and minority populations often receive less care than others, or care of lesser quality.

ABOUT HEALTH EQUITY

- Members of minority communities [have](#) higher rates of chronic illnesses such as diabetes and hypertension. [According](#) to the Centers for Disease Control and Prevention (CDC), 42 percent of adult blacks are hypertensive, compared to 28.8 percent of whites—and levels of control of hypertension are lowest for Mexican Americans. CDC also reported that 7.0 percent of adult white Americans are diabetic, compared to 11 percent of blacks, 10.2 percent of Hispanics, and 8.2 percent of Asian Americans.
- Minorities also have higher rates of many cancers and tend to get diagnosed at later stages, when those illnesses are harder to treat. In 2015, the [National Cancer Institute](#) estimated the death rate from all cancers is 25 percent higher for blacks than for whites.
- There are no simple reasons for disparities, and no simple solutions. Health care access is important, but it is not the only factor. Income, education, social context and support, life experience, perceived discrimination, and patient-level preferences may also contribute. Provider and health care system factors may also play a role.
- As the nation's largest health care system, VA offers a unique opportunity to understand the complex reasons that

health care disparities may occur. VA also offers an ideal setting in which to develop and evaluate patient-centered and culturally sensitive approaches to care.

VA RESEARCH ON HEALTH EQUITY: OVERVIEW

- VA researchers improve the lives of Veterans by identifying disparities in health care between populations of Veterans, understanding the factors that may underlie these differences, and developing and testing ways to reduce and eliminate them.
- One of the nation's premier research sites for such work is the [Center for Health Equity Research and Promotion](#) (CHERP), supported mainly by VA's Health Services Research and Development (HSR&D) service. CHERP has investigators at both the Pittsburgh and Philadelphia VA medical centers.
- In 2007, VA's Evidence-Based Synthesis Program systematically [reviewed](#) existing evidence on disparities within VA to determine the clinical areas in which disparities were present and to describe what was known about the sources of these disparities. VA investigators have used the knowledge gained from that report to determine the most promising avenues for future research aimed at improving equity in VA health care.

SELECTED MILESTONES AND MAJOR EVENTS

- 2001** – Founded the [Center for Health Equity Research and Promotion](#) (CHERP) in Philadelphia and Pittsburgh, PA. In 2013, CHERP became a VA Center of Innovation (COIN)
- 2004** – The [Health Equity and Rural Outreach Innovation Center](#) (HEROIC) in Charleston, South Carolina, began as a targeted research initiative, focused on health equity for rural and minority Veterans and reducing disparities in health outcomes, and improving both access and the quality of care. In 2013, HEROIC became a VA Center of Innovation (COIN)
- 2006** – VA researchers at CHERP published a [conceptual framework](#) to guide future health disparities research: detection, understanding, and reduction and elimination of disparities
- 2007** – Completed a systematic [review](#) of the existing evidence on health care disparities within VA and identified promising areas for future research
- 2011** – Published a systematic [review](#) of Interventions to improve minority health care and racial and ethnic disparities
- 2013** – Established the [VA Office of Health Equity](#)
- 2014** – American Journal of Public

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Health (AJPH) [published](#) Health Equity Supplement on health disparities in VA and among Veterans

2015 – “Update on Prevalence of and Interventions to Reduce Racial and Ethnic Disparities in VA” evidence brief [evaluates](#) gaps in morbidity and mortality outcomes for major conditions [and examines trends in quality of care](#) across these conditions

2016 – Health Services Research & Development [held](#) a field-based research meeting to “engage diverse stakeholders and operational partners in advancing health equity in the VA Healthcare System”

2016 – Released first ever [National Veterans Equity Report](#)

RECENT STUDIES: SELECTED HIGHLIGHTS

• **Women Veterans living in rural and highly rural areas were older and more likely to be married than their urban counterparts**, according to VA’s Office of Rural Health and the University of Colorado. Diagnostic rates were about equal across the groups for several mental health conditions, hypertension, and diabetes. However, non-posttraumatic-stress anxiety was significantly lower for highly rural women Veterans. Rural and highly rural women Veterans were also less likely to visit VA for woman-specific care than urban women Veterans. Those in highly

rural areas were less likely to visit for mental health care, compared with urban women. ([Journal of Rural Health, Spring 2014](#))

• **Medical and mental health disparities exist in VA for clinically diagnosed transgender Veterans, compared with a matched group of Veterans without that diagnosis.**

Researchers at the Mountain Home VA Medical Center and VA’s Office of Health Equity found that transgender Veterans were significantly more likely to suffer from all 10 mental health conditions the study examined, including depression, suicidal thoughts or intentions, serious mental illness, and PTSD. They also had a much higher prevalence of 16 of 17 medical diagnoses studied, with HIV infection accounting for the largest disparity. ([American Journal of Public Health, September 2014](#))

• **Reasons African Americans seek and receive fewer kidney transplants may include concerns for the donor; a general lack of knowledge about the process, including risks, the cost of surgery, and the impact on both the donor and the recipients’ future health; and the difficulty of approaching potential donors.** Researchers from the Ralph H. Johnson VA Medical Center in Charleston and the University of South Carolina asked 27 African Americans who had received new kidneys for their perspectives on this issue. ([Progress in Transplantation, June 2015](#))

• **In more than 1,200 California Veterans with prostate cancer, no significant difference in tumor burden, treatment choice, or survival outcomes was found** between whites and blacks cared for by VA. The study was done by researchers with VA and the University of California, Los Angeles. Another study, conducted by researchers with VA’s New York Harbor Healthcare System and the State University of New York, found little difference in the aggressiveness of prostate tumor growth in black men and white men, and little to suggest that prostate cancer takes a more aggressive course in black men. ([Prostate Cancer and Prostatic Disease, June 2015](#); [Clinical Genitourinary Cancer, August 2015](#))

• **Black Veterans have lower levels of satisfaction with their health care than whites**, according to a CHERP study. The team conducted telephone interviews with 30 black and 31 white Veterans. They found that blacks reported less trust and confidence in their VA providers and the VA health care system, and were less satisfied with their communication with their VA health care providers. Blacks also reported less satisfaction with their outpatient care, but not with their inpatient care. ([Journal of Racial and Ethnic Health Disparities, September 2015](#))

For more information on VA studies on health equity and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

As the nation’s largest health care system, VA offers a unique opportunity to understand the complex reasons why health care disparities may occur.

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VA research on **HEARING LOSS**

Hearing loss affects more than 28 million Americans, including more than half of those over age 75. Hearing problems—including tinnitus—are by far the most prevalent service-connected disability among American Veterans.

ABOUT HEARING LOSS

- Some hearing loss can be reversed through surgery or medication. In other cases, hearing loss is permanent, but can be reduced through the use of hearing aids. Though almost all people with hearing loss could be helped by hearing aids, only about 1 in 5 who would benefit from them uses them, according to the [National Institute on Deafness and Other Communication Disorders](#).
- Conductive hearing loss, which is due to damage to the eardrum and middle ear structures, can often be reversed through surgery or medication. Sensorineural hearing loss, caused by damage to the inner ear and auditory nerve, is permanent, but can often be helped through the use of hearing aids.
- At the close of fiscal year 2015, more than 1 million Veterans were receiving [disability compensation](#) for hearing loss, and 1.45 million received compensation for tinnitus. In addition, many Veterans score normally on hearing tests but have difficulty understanding speech. This condition, called auditory processing disorder, is often associated with blast exposure.

VA RESEARCH ON HEARING LOSS: OVERVIEW

- VA researchers, engineers, and clinicians are studying ways to prevent, diagnose,

and treat hearing loss. They are also addressing a wide range of technological, medical, rehabilitative, and social issues associated with tinnitus and blast exposure.

- In 1997, VA established the National Center for Rehabilitative Auditory Research (NCRAR) to study hearing problems in Veterans, and to develop effective treatments. Researchers here work to alleviate communication, social, and economic problems resulting from hearing loss and tinnitus. Among the topics studied at the center are methods of early detection of hearing loss; the effects of certain diseases or conditions, such as diabetes and multiple sclerosis, on auditory functioning; and the impact of auditory problems on speech perception.
- NCRAR researchers and their colleagues throughout VA system are looking at ways to improve speech recognition in noisy areas for people with hearing impairments, and studying the combined effects of aging and noise exposure on hearing.

SELECTED MILESTONES AND MAJOR EVENTS

- 1992** – Began, with the National Institutes of Health (NIH), an innovative [collaboration](#) to support the development of advanced hearing aids
- 1996** – [Initiated](#), with NIH, the Hearing Aid

Clinical Trial to demonstrate the efficacy of three types of analog hearing aids in both quiet and noisy environments

1997 – Established the [National Center for Rehabilitative Auditory Research](#) (NCRAR) in Portland, Oregon

2000 – [Demonstrated](#), with NIH, that three types of analog hearing aids provided substantial improvements for users both in quiet and noisy environments

2005 – Published a comprehensive protocol for the management of tinnitus, now referred to as [Progressive Tinnitus Management](#) (PTM)

2014 – [Linked](#) exposure to jet propulsion fuel to auditory processing problems

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Tinnitus is common in Veterans, but there are no objective tests to diagnose the problem.** NCRAR researchers and researchers from Oregon Health and Science University conducted three phases of testing to try to distinguish Veterans with tinnitus from those who do not have it. They found some differences between the groups, but also that no single test or series of tests could reliably diagnose the condition. ([Journal of Rehabilitation Research & Development](#), Vol. 50, No. 4, 2013)

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• **Exposure to jet propulsion fuel-8 (JP-8) is linked with auditory processing dysfunctions—changes that occur inside the brain rather than the ear.** In auditory processing dysfunction, people hear sounds properly, but the brain has a hard time deciphering the message. A research team from the VA Loma Linda Healthcare System in California believes that hydrocarbon chemicals in JP-8 may be the reason this occurs, and advocates for increased monitoring of the combined exposure of fuel and noise around aircraft. ([Journal of Toxicology and Environmental Health Part A](#), 2014)

• **Veterans with tinnitus frequently have anxiety, depression, or both,** according to researchers with VA and Loma Linda University Medical School. The team found that 71.9 percent of the 91 Veterans with tinnitus they studied also had a diagnosis of anxiety, 59.3 percent had depression, and 58.2 percent had both conditions. Patients with either or both conditions suffered from more severe tinnitus symptoms than patients without either condition. ([International Journal of Otolaryngology](#), 2015)

• **Frequency modulation (FM) may help Veterans who have normal hearing but problems understanding speech due to mild traumatic brain injury.** NCRAR and Tampa VA researchers

tested an FM system, which uses radio waves to transmit signals directly from a microphone to an earpiece to make a speaker's voice more clear. They also tested a "brain training" computer program that has users follow instructions or interpret sound. Preliminary results showed improved outcomes among those using the system. ([Journal of Rehabilitation Research and Development](#), Vol. 52, No. 4, 2015)

• **Blast injuries can and do result in damage to the central auditory system,** but there is no common set of symptoms relating to problems with auditory processing experienced by Veterans exposed to blasts. NCRAR asked 99 Veterans exposed to blasts in Iraq and Afghanistan who reported problems hearing in difficult listening situations to participate in 10 performance-based tests that have been shown to uncover problems people may have in processing hearing signals. They found many of the participants had difficulty in one or more of the tests compared to non-blast exposed Veterans, but that they also performed well in other tests. ([Journal of Rehabilitation Research and Development](#), Vol 52, No, 3, 2015)

• **VA researchers are studying the effects of a treatment called transcranial magnetic stimulation**

(TMS) on tinnitus. In TMS, clinicians hold a magnetic coil, usually in the form of a figure eight, against the skull. The coil emits repetitive electromagnetic pulses that reach the brain cells under the scalp and change their activity pattern. In a recent NCRAR study, 32 Veterans received TMS treatments for 10 working days; another 32 received a placebo treatment. 56 percent of those who received the TMS treatment saw their tinnitus symptoms improve, compared to 22 percent of those who received a placebo treatment. ([JAMA Otolaryngology-Head and Neck Surgery](#), Aug. 14, 2015)

• **A device called OtoID allows patients to easily and reliably test their own hearing loss.** Designed by NCRAR researchers to help patients using chemotherapy drugs, OtoID runs on tablet computers and allows hearing test results to be transmitted to VA clinics. If hearing loss is detected, doctors will be able to adjust the dose of the drug the patient is taking, or perhaps use a different one. ([Journal of the American Academy of Audiology](#), October 2015)

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

Though almost all people with hearing loss could be helped by hearing aids, only about 20 percent of those would benefit from them use them.

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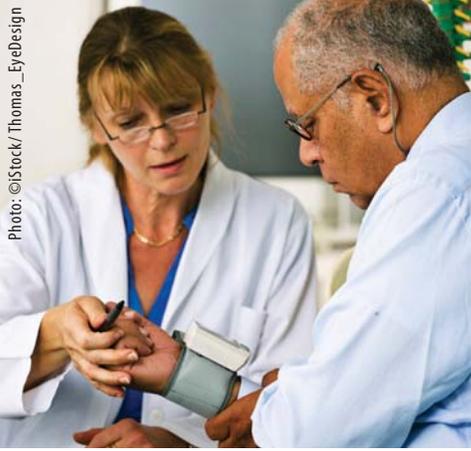


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VA research on HEPATITIS C

Hepatitis C, caused by the hepatitis C virus (HCV), is a condition marked by inflammation of the liver. HCV is spread through contact with infected blood or contaminated IV needles, razors, tattoo tools, or other items.

ABOUT HEPATITIS C

- The symptoms of hepatitis C infection are often very mild. Most people can carry the virus for years and will not notice any symptoms. The most common symptoms are vague abdominal discomfort, fatigue, and joint pains.
- Over time, HCV can cause other health problems, such as cirrhosis and liver cancer. Because the virus stays in the body, an infected person can give hepatitis C to someone else.
- People at risk for hepatitis C should consider getting tested. Blood tests are required to determine if HCV is present in the body.
- As of March 2016, VA had [treated](#) more than 76,000 Veterans infected with hepatitis C and approximately 60,000 had been cured. Since the beginning of 2014 and as of March 2016, more than 42,000 patients had been treated with new, highly effective antiviral medications.
- In fiscal year 2015, VA allocated \$696 million for new hepatitis C drugs, which is 17 percent of VA's total pharmacy budget.

VA RESEARCH ON HEPATITIS C: OVERVIEW

- VA research on hepatitis C includes clinical trials of treatments, epidemiologic studies, investigations of the biological mechanisms of infection, and studies on identifying and removing barriers to treatment.
- Some VA researchers are working on projects to improve screening and testing methods for HCV. Others are working to improve the assessment and treatment of patients traditionally excluded from hepatitis C treatment, including those with mental illness, substance abuse, or who also are infected with the human immunodeficiency virus (HIV), the virus that causes AIDS.
- In addition, VA researchers are developing and disseminating models of interdisciplinary care to optimize treatment and clinical standards for treating patients at all stages of HCV infection.

SELECTED MILESTONES AND MAJOR EVENTS

- **2011** – Established the VA National Hepatitis C program (now the [National](#)

[Viral Hepatitis Program](#)) within VA's Office of Public Health

- **2013** – [Determined](#) that patients with both anemia and the HCV virus can benefit from intensive treatment for the virus
- **2015** – [Learned](#) that cure rates from new HCV treatments were much better than previous treatments, but not as good as rates reported in clinical trials
- **2015** – [Developed](#) a new model to help identify which patients chronically identified with HCV have the greatest need for new antiviral drugs
- **2016** – [Found](#) that patients with HCV infections are at increased risk of developing osteoporosis and fractures

RECENT STUDIES: SELECTED HIGHLIGHTS

- **A new model uses routine laboratory tests and machine-learning methods** to help identify which patients clinically identified with HCV have the greatest need for new antiviral drugs. According to researchers from the VA Ann Arbor Healthcare System and the University of Michigan, hepatitis will remain stable

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without treatment, perhaps for many years, in most patients. One-third of patients, however, are at high risk of complications and need immediate care to prevent the virus from causing further liver damage. The test will identify these patients. (*Hepatology*, June 2015)

• **Statins improved outcomes among Veterans receiving antiviral treatment for hepatitis C.** Researchers from the VA Pittsburgh Healthcare System found that those who used statins were significantly more likely to have a sustained response to antiviral therapy, compared with those who did not (39 percent versus 33 percent). Statin users were also less likely to progress to cirrhosis (17 percent versus 25 percent) or to develop liver cancer (1.2 percent versus 2.6 percent). (*Hepatology*, August 2015)

• **Cure rates range from 67 to 79 percent** for patients using sofosbuvir (sold as Sovaldi), a new drug for the treatment of hepatitis C, according to an observational study of more than 4,000 Veterans conducted by the VA Palo Alto Health Care System. These cure rates are far better than those of previous HCV treatments, but fall short of the rates

seen in clinical trials of sofosbuvir. A newer drug, Harvoni, was not included in the Palo Alto trial, as the drug was not FDA-approved when the trial was conducted. (*Alimentary Pharmacology and Therapeutics*, September 2015)

• **Veterans with substance use or psychiatric disorders and HCV infections** who received care that fully integrated support for their mental health issues and their hepatitis C infection under the supervision of a care manager were more likely to receive antiviral therapy than those whose care was not integrated. Researchers at the VA San Diego Healthcare System also found that Veterans with care managers were also more likely to successfully complete antiviral therapy and have undetectable virus loads at its completion, compared to those who received usual methods of care. (*Clinical Gastroenterology and Hepatology*, November 2015)

• **Veterans with HCV and liver cirrhosis are significantly less likely to die** or to progress to a stage in the disease called decompensated cirrhosis if they use statins to control blood cholesterol. According to a team from the VA Connecticut Healthcare System

and Yale University, until randomized controlled trials are conducted, statins cannot be widely recommended for all people with HCV and cirrhosis, but patients with HCV who would require statins for other health issues such as high cholesterol should be prescribed those drugs. (*Gastroenterology*, February 2016)

• **Patients with HCV infections are at increased risk of developing osteoporosis and bone fractures,** and the risk is greatest for patients who have both HIV (the virus that causes AIDS) and HCV infections. Researchers at the VA North Texas Health Care System and the University of Texas Southwestern found that patients with HIV and HCV have a threefold greater risk of developing fractures compared with people who have neither infection, and that those with both infections also have significant additional risk compared to patients who are only infected with HIV. (*Current Opinion in HIV and AIDS*, May 2016)

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

As of March 2016, VA had treated more than 76,000 Veterans infected with hepatitis C, and approximately 60,000 had been cured.

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VA research on **HOMELESSNESS**

Being homeless, or being at risk of homelessness, is one of the most difficult problems any Veteran can face. VA has made ending Veterans' homelessness a top priority.

ABOUT HOMELESSNESS AMONG VETERANS

• VA and its federal, state, local, and nongovernmental partners recognize that ending Veteran homelessness is not a single event in time, but rather a deliberate ongoing effort toward achieving and maintaining the goal of ending homelessness among Veterans.

• The U.S. Department of Housing and Urban Development's annual point-in-time estimate of America's homeless population [found](#) that fewer than 40,000 Veterans were experiencing homelessness (including those living on the street or in a shelter, temporary safe haven, or any place unfit for habitation) on a given night in January 2016. The January 2016 estimate found just over 13,000 unsheltered homeless Veterans actually living on the streets, a 56 percent decrease since 2010.

• VA's [National Center on Homelessness Among Veterans](#) (NCHAV), established in 2009, works to promote recovery-oriented care for Veterans who are homeless or at risk for homelessness by developing and disseminating evidence-based policies, programs and best practices.

• The [Domiciliary Care for Homeless Veterans](#) program has been providing medical services to disadvantaged Veterans since the close of the Civil War.

• The [National Call Center for Homeless Veterans](#) (1-877-4AID-VET) is staffed by trained responders providing support and resources to Veterans and their families who lack secure housing. Live chat with trained responders is available at the Veterans Crisis Line [website](#).

VA RESEARCH ON HOMELESSNESS: OVERVIEW

• VA research looks at the causes and risks of homelessness among Veterans, and ways to prevent Veterans from becoming homeless.

• Researchers help develop interventions to improve homeless Veterans' health and provide resources and training to professionals working on their behalf.

• VA researchers have helped VA implement the Housing First approach, which aims to get homeless people into safe, stable housing even if they are still coping with substance use or mental health issues.

SELECTED MILESTONES AND MAJOR EVENTS

1987 – Initiated the [Northeast Program Evaluation Center](#) (NEPEC) to serve homeless Veterans

1991 – [Established](#) that, in Vietnam Veterans, there does not appear to be a

causal relation between homelessness and military service, including exposure to combat

2013 – [Determined](#) there is an association between homelessness among Veterans and childhood problems such as abuse and family instability

2015 – [Learned](#) that 30 percent of female and 9 percent of male homeless Veterans have children in their custody

2015 – [Found](#) that Veterans who had been discharged from the military for misconduct had dramatically higher rates of homelessness than those who left under normal circumstances

RECENT STUDIES: SELECTED HIGHLIGHTS

• **VA's Housing First mode of care enables people who have not yet achieved sobriety or are still exhibiting symptoms of mental health problems to receive permanent housing** through government-funded rental vouchers. A survey of nearly 100 VA employees, taken by researchers at the Birmingham VA Medical Center, found that front-line staff faced challenges in housing homeless Veterans quickly because of difficult rental markets, the need to coordinate with local public housing authorities, and a lack of available funds for move in costs. They also found,

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however, that 80 to 90 percent of Veterans housed in this program were able to remain in that housing. (*Psychiatric Services*, May 1, 2014)

• **Many people living on the streets prioritize having a mobile phone**, to give them an identity and a way of communicating with the world. Researchers from VA's Center for Healthcare Organization and Implementation Research in Bedford, Massachusetts, interviewed 109 Veterans in a variety of that state's homeless programs. They found that 89 percent of those surveyed owned a mobile phone, and 76 percent used the Internet. Of those with phones, 93 percent were interested in receiving either text messages or phone calls about upcoming medical appointments, and 88 percent wanted to be asked by phone if they would like to schedule an appointment if they had not been seen by a health care provider in over a year. (*Telemedicine Journal and E-Health*, September 2014)

• **VA medical centers that have successfully implemented Housing First share several significant characteristics**, according to Birmingham VA researchers. The leaders of successful medical centers join front-line staff in the work of finding acceptable housing; elevate people

knowledgeable about homelessness into senior leadership positions; and work to resolve logistical challenges. They also help ensure that work groups dealing with homelessness are properly aligned and integrated into their organizations. (*Journal of General Internal Medicine*, December 2014)

• **Both male and female Veterans are at greater risk for homelessness than their non-Veteran counterparts, although the disparity has declined over time.** According to researchers with the VA Connecticut Health Care System and Yale University, this disparity is most prominent among Veterans of the all-volunteer force—those who signed up for the armed services after July 1, 1973, when the draft was eliminated. The researchers stated that Veterans appear to have many of the same major risk factors for homelessness as other adults, with the strongest and most consistent ones being substance abuse, severe mental illness, and low income. (*Epidemiologic Reviews*, 2015)

• **Homeless Veterans are infected with HIV, the virus that causes AIDS, at least three times more often than the rest of the U.S. population.** A study led by researchers at the VA Greater Los Angeles Healthcare System repeatedly visited three Los Angeles

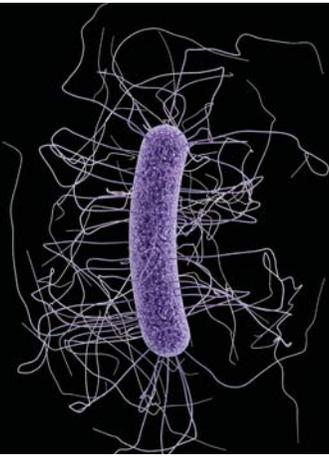
shelters to provide AIDS testing, results, and follow-up if necessary to Veterans and other residents. The team believes that given the high costs and health risks of untreated HIV infection, the program's cost of \$48.95 per client tested is cost-effective and could significantly reduce HIV rates among homeless Veterans. (*American Journal of Public Health*, January 2015)

• **Veterans who had been discharged from the military between 2001 and 2012 for misconduct had dramatically higher rates of homelessness** than those who left under normal circumstances, a study by researchers with VA's Salt Lake City Health Care System and NCHAV has found. Overall, 1 percent of VA patients were homeless at some point within a year of their discharge, but 5.4 percent of those discharged for misconduct fell in that category. Misconduct is defined as a discharge related to drug use, alcoholism, offenses against the military code of conduct, infractions of the law, or other misbehaviors. (*Journal of the American Medical Association*, Aug. 25, 2015)

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

VA research looks at the causes and risks of homelessness among Veterans, and ways to prevent Veterans from becoming homeless.

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VA research on INFECTIOUS DISEASES

Infectious diseases are disorders caused by microorganisms such as bacteria, viruses, fungi, or parasites. Microorganisms that cause disease are collectively called pathogens.

ABOUT INFECTIOUS DISEASES

- While many organisms live in and on humans, and are normally harmless or even helpful, some can cause disease under certain conditions. They do so either by disrupting the body's normal processes or by stimulating the immune system to produce a defensive response, resulting in high fever, inflammation, and other symptoms.
- Some infectious diseases can be passed from person to person through contact with bodily fluids, coughing, sneezing, and other methods. Others are transmitted from insect or animal bites, or by ingesting contaminated food or water or other environmental exposures.
- Many infectious diseases can become difficult to control, if the infectious agents develop a resistance to commonly used drugs. Bacteria, for example, can accumulate mutations in their DNA, or acquire new genes that allow them to survive contact with antibiotics that would normally kill them.
- VA has [determined](#) that nine infectious diseases are related to military service in the first Gulf War, Iraq, and Afghanistan. They include malaria, brucellosis, campylobacter jejuni, coxiella burnetii (Q fever), mycobacterium tuberculosis, nontyphoid salmonella, shigella, visceral leishmaniasis, and west Nile virus.

VA RESEARCH ON INFECTIOUS DISEASES: OVERVIEW

- VA researchers are advancing the understanding, prevention, and treatment of numerous infectious diseases, ranging from the common cold to major public health threats such as tuberculosis, AIDS, hepatitis C, and influenza.
- A number of effective new preventive strategies, vaccines, and drugs for infectious diseases have been developed by VA investigators.
- Some researchers are focusing on infectious diseases that may endanger American troops serving abroad, such as malaria and leishmaniasis. Others are searching for new approaches to treat infectious diseases, focusing on how pathogens change and drug resistance evolves.

SELECTED MILESTONES AND MAJOR EVENTS

- 1946** – Developed and tested effective therapies for tuberculosis through multicenter clinical trials that led to the development of the [VA Cooperative Studies Program](#)
- 2005** – [Demonstrated](#) the effectiveness of a new vaccine for shingles, a painful skin and nerve infection affecting older adults
- 2011** – Published [findings](#) showing a 60 percent or greater decrease in MRSA

infections from a VA-wide infection control initiative

2014 – [Learned](#) that treatment for pneumonia that included the antibiotic azithromycin (Zithromax) was associated with a significantly lower risk of death and a slightly increased risk of heart attack

2015 – [Found](#) that patients who received antiretroviral therapy within a year of their infection were half as likely to develop AIDS, compared with those who waited longer

2016 – [Determined](#) that a hospital infection-control program aimed mainly at methicillin-resistant Staphylococcus aureus (MRSA) can also significantly reduce transmission of bacteria that cause infections such as pneumonia, blood infections, surgical infections, and meningitis

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Treatment for pneumonia that included the antibiotic azithromycin (Zithromax) compared with other antibiotics was associated with a significantly lower risk of death and a slightly increased risk of heart attack.** Researchers from several VA facilities concluded there is a net benefit associated with azithromycin use in patients hospitalized for pneumonia. ([Journal of the American Medical Association](#), June 4, 2014)

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• **Patients who received antiretroviral therapy within a year of their infection were half as likely to develop AIDS**, compared with those who waited longer. They were also more likely to achieve and maintain a normal level of infection-fighting T-cells. A study by researchers from the South Texas VA Healthcare System and the University of Texas contradicted traditional HIV treatment methodology, which encourages physicians to wait until patients reached certain infection thresholds before recommending antiretroviral therapy. ([JAMA Internal Medicine](#), January 2015)

• **An algorithm to help hospitals and public health officials determine the earliest stages of flu season** has been developed by researchers with VA and other health care institutions throughout the nation. The algorithm, which researchers call the Above Local Elevated Respiratory Illness Threshold (ALERT) uses routine information, such as the number of influenza cases confirmed per week in a region, to determine where and when the flu needs to be combatted. Having this information could help public health officials preserve resources while combatting the virus. ([Clinical Infectious Diseases](#), Feb. 15, 2015)

• **In 12 minutes, a pulsed xenon ultraviolet (UV) light system could disinfect a hospital room as well as a human can.** Before and after UV disinfection, researchers from the Central Texas Veterans Health Care System took samples of five “high-touch” surfaces in 38 patient rooms, including the patient call button, bedrail, and tray table, as well as the handrail and toilet in the restroom. They found that the UV method cut the number of bacterial colonies per room by about 70 percent, roughly the same level of effectiveness as manual disinfection. ([American Journal of Infection Control](#), April 1, 2015)

• **Giving spores of nontoxic C. difficile by mouth can stop repeated bouts of C. difficile infection.** An international team of researchers led by investigators with the Edward Hines, Jr. VA Hospital in Illinois randomly assigned 168 adult patients with C. difficile infections who had been treated for their infection to receive doses of either 10,000 or 10 million spores per day of nontoxic C. difficile in liquid form for 7 or 14 days, or to receive an identical-looking placebo. Statistically significant reductions of relapses in infection were shown in those who received any dose of nontoxic C. difficile; the best results

were shown in those who received 10 million spores a day for seven days. C. difficile is an intestinal bacterial infection that is difficult to treat using standard antibiotic treatment, because it has a very high recurrence rate. ([Journal of the American Medical Association](#), May 5, 2015)

• **A procedure that dates back thousands of years can be an effective method for battling C. difficile infections.** The procedure, called fecal transplantation, involves removing stool containing healthy bacteria from a donor and inserting it into a sick patient. VA researchers and researchers with the University of Minnesota found that fecal transplantation proved successful in treating 85 percent of patients with recurring infections, and that such transplantation is a safe and effective way to treat recurrent infections. ([Annals of Internal Medicine](#), May 5, 2015)

For more information on VA studies on infectious diseases and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

VA researchers are advancing the understanding, prevention, and treatment of numerous infectious diseases, ranging from the common cold to major public health threats such as tuberculosis, AIDS, hepatitis C, and influenza.

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VA research on **KIDNEY DISEASE**

Kidney disease kills 90,000 Americans every year—more than cancers of the breast and prostate combined.

ABOUT KIDNEY DISEASE

- The kidneys are a pair of fist-sized organs located on either side of the spinal column that perform life-sustaining functions to keep the rest of the body in balance.
- Early kidney disease has few symptoms. As it worsens, many complications—such as high blood pressure, arteriosclerosis (thickening and hardening of the artery walls), anemia, weak bones, and nerve damage—can develop.
- Some forms of kidney failure are temporary and may get better. This is called acute kidney failure. Chronic or end-stage kidney failure is the result of a scarring process that leads to the shutdown of the kidneys.
- Chronic kidney failure does not get better. Veterans with chronic kidney failure need dialysis treatments (artificial replacement of kidney function) for the rest of their lives, or may receive a kidney transplant.

VA RESEARCH ON KIDNEY DISEASE: OVERVIEW

- In 2012, VA and the University of Michigan began creating a national kidney disease

registry to monitor kidney disease among Veterans. This registry will provide information on kidney disease to Veterans, help identify those at risk for kidney disease, and improve access to care.

- Dr. Thomas E. Starzl conducted the first long-term successful kidney transplant in 1962 while on the staff of the Denver VA Medical Center.
- Research has found that rates of chronic kidney disease are higher among Veterans than in the general population. VA researchers are working on ways to diagnose chronic kidney disease earlier and more effectively treat it.
- VA researchers are studying the relationship between kidney disease and other diseases to find better therapies and drug treatments for the condition.

SELECTED MILESTONES AND MAJOR EVENTS

1962 – Conducted the first long-term successful kidney transplant, by [Dr. Thomas E. Starzl](#), a VA surgeon and researcher

1998 – [Learned](#) that if erythropoietin is injected under the skin instead of into a

vein, smaller doses of the medication can be used

2008 – [Determined](#) that high-intensity renal-replacement therapy in critically ill patients with acute kidney injury is no better than less intensive therapy

2012 – Established, along with the University of Michigan, a [National Kidney Disease Registry](#) to monitor kidney disease among Veterans

2015 – [Found](#) that patients with chronic kidney disease were more likely to have vascular diseases, diabetes, hypertension, and cancer than those without the condition

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Patients with chronic kidney disease are more likely to have other chronic diseases** such as vascular disease, diabetes, and cancer. A study involving VA researchers in Richmond, Va., and Buffalo, N.Y., showed that Veterans have a higher rate of CKD than the general U.S. population, and those with CKD had much higher rates of other diseases, compared with other populations of kidney patients.

(Continued on back)



The researchers say overall, CKD is a growing epidemic associated with a high frequency of chronic illnesses. ([Renal Failure](#), Dec. 16, 2015)

- **Patients who develop acute kidney injury during hospitalization are at substantial risk to develop chronic kidney disease**, according to an analysis of Veterans Health Administration data. Timing of AKI recovery is a strong predictor of the risk for chronic kidney disease. ([American Journal of Kidney Diseases](#), Dec. 12, 2015)
- **Diabetes can often lead to end-stage renal disease**, also known as kidney failure, which requires dialysis or kidney transplant. The VA Nephropathy in Diabetes Trial found that high blood pressure in proteinuric diabetic kidney disease is associated with worse kidney outcomes and that control of blood pressure can delay disease progression. ([Clinical Journal of the American Society of Nephrology](#), Dec. 7, 2015)
- **Many medications given to older Veterans may cause problems for those with chronic kidney disease.**

Researchers examining VA pharmacy, lab, and other data sources found that several drugs that should not be taken when kidney function is impaired are being prescribed, and that some drugs are being prescribed at too high a dose to older Veterans. ([Journal of the American Geriatrics Society](#), Oct. 27, 2015)

- **Veterans with restless leg syndrome were three times more likely to have kidney disease**, relative to those without RLS, according to a study led by researchers from the Memphis VA Medical Center. People with RLS feel an uncontrollable urge to keep moving their legs when they lie down and try to rest. ([Journal of Sleep Research](#), Sept. 17, 2015)
- **The Million Veteran Program is the nation’s largest database linking genetic, clinical, lifestyle and military exposure information**, and has enrolled more than 450,000 Veterans. Dr. Adriana Hung at the VA Tennessee Valley Healthcare System will use this program to study how genes affect the risk and progression of kidney disease. ([VA Research Currents](#), July 6, 2015)

- **Researchers at the VA Palo Alto Health Care System found that patients with end-stage renal disease who had taken part in an education program had a lower mortality rate than those who had not participated.** Nearly 26 million Americans are estimated to have chronic kidney disease, yet many don’t even know it. Education about the disease and treatment options can make a big difference in patient outcomes, say the researchers. ([Kidney International](#), March 2014)
 - **A VA and National Institutes of Health research team found that undergoing dialysis six times a week was not any better for critically ill patients with acute kidney injury** than undergoing the treatment three times a week. AKI is a sudden loss of kidney function that develops within 48 hours. AKI can be caused by disease, some antibiotics, injuries or other issues. ([New England Journal of Medicine](#), July 3, 2008)
- For more information on VA studies on kidney disease and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics**

VA researchers are working on ways to diagnose chronic kidney disease earlier and treat it more effectively.

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VA research on MENTAL HEALTH

According to the most recent National Survey on Drug Use and Health, an estimated 43.8 million adults had a mental illness in 2014 (not including substance use disorders), representing about 18 percent of all U.S. adults.

ABOUT MENTAL HEALTH

- VA [offers](#) a wide range of mental health services to Veterans. The goal of VA mental health care is to support recovery and enable Veterans who experience mental health problems to live meaningful lives in their communities and achieve their full potential.
- VA aims to provide coordinated care for the whole person, not just for the person's mental illness. The department promotes the idea that having a healthy body, satisfying work, and supportive family and friends are integral to mental health.
- All Veterans who receive specialty mental health care have mental health treatment coordinators to help them define and work toward their overall mental health goals.
- Mental health services are available in VA's mental health specialty clinics, primary care clinics, nursing homes, and residential care facilities. Those with serious mental health problems may take part in specialized programs such as mental health intensive case management, day centers, work programs, and psychosocial rehabilitation.
- Emergency mental health care is available 24 hours a day, seven days a week at VA medical centers. Facilities that do not have 24-hour emergency rooms must provide

emergency services through a local non-VA hospital.

- Veterans thinking about hurting or killing themselves or others, experiencing an emotional crisis, feeling hopeless or engaging in self-destructive behavior such as drug abuse, should call the [Veterans Crisis Line](#) at 1-800-273-TALK (8255). Press 1 for Veterans.
- The area of mental health is covered in several other VA fact sheets as well as this one, including Depression, Posttraumatic Stress Disorder (PTSD), Substance Use Disorders, and Suicide Prevention.

VA RESEARCH ON MENTAL HEALTH: OVERVIEW

- VA researchers are looking at potential new approaches for treating and preventing mental health disorders. They are also working on related projects such as developing and evaluating collaborative primary care models, and improving access to services from rural and other remote areas by using the Internet and other technologies.
- Among the areas VA researchers are focusing on are mood disorders, such as depression and bipolar disorder; psychotic disorders, such as schizophrenia; PTSD and other anxiety conditions; and substance use disorders.

- VA investigators are also looking at the co-occurrence of mental health issues and physical disorders—for instance, depression in those with spinal cord injury, or substance abuse in patients with chronic pain.
- The [National Research Action Plan](#) is a wide-reaching plan developed in 2013 by VA and the departments of Defense; Health and Human Services; and Education. The plan is designed to improve access to mental health services for Veterans, service members, and military families. Implementation of the plan will improve scientific understanding of PTSD, traumatic brain injury (TBI), various co-occurring conditions, and suicide. Other goals of the plan include providing effective treatments for these diseases, and reducing their occurrence.
- VA's 15 [Mental Illness Research, Education, and Clinical Centers](#) (MIRECCs) were established by Congress with the goal of researching the causes and treatments of mental disorders, and using education to put new knowledge into routine clinical practice in VA. Specialized mental health centers of excellence are an essential part of VA's ability to meet Veterans' mental health needs.

(Continued on back)



SELECTED MILESTONES AND MAJOR EVENTS

- 1941** - Set up a research lab in Northport, New York, to conduct clinical and biomedical research in neuropsychiatric disorders
- 1989** - Created the [National Center for PTSD](#) to address the needs of Veterans and other trauma survivors with posttraumatic stress disorder (PTSD)
- 1997** - [Identified](#) a gene associated with a major risk for schizophrenia
- 2003** - [Determined](#) that while atypical antipsychotic drugs vary in cost, there is limited evidence of differences in effectiveness
- 2006** - Developed, through VA's [TIDES](#) project, an evidence-based collaborative approach to depression management
- 2013** - [Determined](#) an association between homelessness among Veterans and childhood problems such as abuse and family instability
- 2015** - [Found](#) that a loss of gray matter in three separate brain structures is common across a spectrum of psychiatric disorders widely perceived to be distinct

RECENT STUDIES: SELECTED HIGHLIGHTS

- **There are 108 genetic locations where the DNA of people with schizophrenia tends to differ from those who do not have the disease.** An international study in which VA researchers took part analyzed DNA from nearly 37,000 people in Europe and Asia with schizophrenia, and more than 113,000 without the disease. While most of the genes implicated in the study are expressed in the brain, others appear to play a role in the body's immune system, supporting a link between the immune system and schizophrenia. About three-quarters of the genetic locations identified in the study had not been previously reported. ([Nature](#), July 24, 2014)
- **Providing additional doses of the hormone oxytocin through a nasal spray may help those with schizophrenia.** Researchers from the VA Desert Pacific Mental Illness Research, Education, and Clinical Center and the University of California, Los Angeles, provided 27 men with schizophrenia with either oxytocin or a placebo once a week for 12 weeks. All of the participants were also given training on social cognitive skills, including the

ability to identify facial emotions, social perception, and empathy. The team found that the group receiving oxytocin did significantly better than the group receiving a placebo in the area of "empathic accuracy"—understanding how others feel when they show emotion. ([Neuropsychopharmacology](#), Aug. 2014)

- **The health of older men is particularly vulnerable to stressors, and these stressors can contribute to a shorter life,** according to a VA and Oregon State University team. Of 1,293 older men in the study, those whose daily life was significantly stressful were three times more likely to die in a 15-year period than those who found their lives to be not very stressful, or only moderately stressful. ([Experimental Gerontology](#), November 2014)

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

VA investigators are looking at the co-occurrence of mental health issues and physical disorders—for instance, depression in those with spinal cord injury, or substance abuse in patients with chronic pain.

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VA research on **OBESITY**

Overweight and obesity are terms used for ranges of weight that are greater than what is considered healthy. According to the U.S. Centers for Disease Control and Prevention, nearly 35 percent of American adults—more than 78 million—are obese.

ABOUT OBESITY

- Obesity results from a combination of causes and contributing factors, including individual factors such as behavior and genetics.
- Behaviors contributing to obesity can include dietary patterns, physical activity or inactivity, medication use, and exposures to various environmental factors. Additional contributing factors in American society include the food and physical activity environment, education and skills, and food marketing and promotion.
- Obesity is a risk factor for heart disease, type 2 diabetes (once known as adult-onset or noninsulin-dependent diabetes), stroke, and some types of cancer. In particular, diabetes and obesity have become a very prevalent combination.
- In 2013, VA [estimated](#) that more than 165,000 Veterans who receive their health care from the department have a body mass index (BMI) of more than 40, which indicates a serious condition called morbid obesity. Morbid obesity can interfere with basic physical functions and significantly increase the risk of obesity-related conditions.

VA RESEARCH ON OBESITY: OVERVIEW

- VA research on obesity looks at the biological processes of weight gain and weight loss. Researchers compare the safety and effectiveness of obesity treatments, and work to find ways to help Veterans keep from gaining weight—for example, through exercise and healthy eating.
- VA researchers work hand in hand with the department’s [MOVE!](#) program, a national weight-management and exercise initiative designed and coordinated by [VA’s National Center for Health Promotion and Disease Prevention](#).

SELECTED MILESTONES AND MAJOR EVENTS

- 2002** – [Reported](#) key findings on ghrelin, a “hunger hormone” that was first discovered in 1999
- 2006** – Implemented VA [MOVE!](#) program nationally, providing overweight Veterans with the largest and most comprehensive weight management program associated with a U.S. medical care program
- 2013** – [Found](#) that Iraq and Afghanistan Veterans with PTSD and depression are at the greatest risk of obesity and not being

able to lose weight, relative to all those who served in the two countries between 2001 and 2010

2015 – [Learned](#) that bariatric surgery helps overweight patients live longer

2016 – [Found](#) that as fat cells develop, they change the types of nutrients they metabolize to produce fat and energy—an important step towards finding new ways to treat both diabetes and obesity

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Many health care providers have strong negative attitudes and stereotypes about people with obesity**—and these attitudes influence their perceptions, judgment, interpersonal behavior, and decision-making. A team of researchers with VA’s Center for Chronic Disease Outcomes Research also found that these biases were more negative than those exhibited toward racial minorities, gays, lesbians, and poor people. The researchers believe that doctors should discuss weight issues with obese patients, but should do so in a less judgmental, more affirming way—making the discussion about feeling good, not about a number on a scale. ([Obesity](#), April 2014; [Obesity Reviews](#), April 2015)

(Continued on back)



• **VA MOVE! programs throughout the nation are helpful even when participants are at locations other than where the classes are taught.**

Researchers at the Sioux Falls VA Health Care System studied weight loss outcomes among 120 Veterans, half of whom took 12 MOVE! classes to help them develop weight-management skills through videoconferencing. The others took no classes. The MOVE! participants lost weight, while the control group gained weight. The average weight difference between the groups was about 12 pounds after one year. ([Journal of Rural Health](#), Winter 2014)

• **Fat cells, or adipocytes, are connective tissue cells that have become differentiated from other cells**

and become specialized in the manufacture and storage of fat. Researchers at the VA San Diego Healthcare System and the University of California learned that as fat cells develop, they change the types of nutrients they metabolize (process). They create branched-chain amino acids, along with glucose, to produce fat and energy. Therefore, fat cells play an important role in regulating the body's levels of these amino acids, which are typically found in higher levels in people with diabetes and obesity. A better understanding of how these amino acids are created could lead to

new treatments for these conditions.

([Nature Chemical Biology](#), January 2016)

• **More creative designs for weight-loss incentive programs are needed to overcome barriers to behavior change,**

according to researchers from the Corporal Michael J. Crescenz VA Medical Center in Philadelphia and the University of Pennsylvania. The team looked at three incentive programs, two of which offered participants the opportunity to have their health care premiums reduced if they lost weight. Participants in the third intervention group could receive prizes in a daily lottery if their weight was reduced. A fourth group was offered no financial incentive. Twelve months after enrollment, the average weight of all the groups stayed about the same, with no statistically significant changes among them. ([Health Affairs](#), January 2016)

• **Bariatric surgeries help severely overweight people live longer,**

not only to shed pounds they cannot otherwise lose. A study by researchers at several VA medical centers found that 2,500 severely overweight Veterans who had the surgery had a 53 percent lower risk of dying from any cause 5 to 10 years after the procedure, compared with 7,500 other severely overweight Veterans who had not. ([Journal of the American Medical Association](#), Jan. 6, 2015)

• **Eating sweet foods causes the brain to form a memory of a meal.**

A study by researchers at the Charlie Norwood VA Medical Center in Atlanta and two Georgia universities showed that neurons in the dorsal hippocampus, the part of the brain that is critical for episodic memory, are activated by consuming sweets. Meals consisting of a sweetened solution, either sucrose or saccharin, significantly increased the expression of activity-related cytoskeleton-associated protein (Arc) in dorsal hippocampal neurons in rats—a process that is necessary for making memories. ([Hippocampus](#), March 2016)

• **The drug rapamycin reduces body fat and appetite in older rats,**

according to a study by researchers at the Malcolm Randall VA Medical Center in Gainesville and the University of Florida. Rapamycin is a pharmaceutical used to coat coronary stents and prevent transplant rejection. The research team found that when treated with rapamycin, the body weight of 24-month-old rats dropped by approximately 13 percent. Rats of that age are about equivalent in their life cycle to 65-year-old humans. ([The Journals of Gerontology, Series A](#), July 2016)

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

Obesity is a risk factor for heart disease, type 2 diabetes, stroke, and some types of cancer.

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VA research on PAIN MANAGEMENT

Pain is one of the most common reasons Americans consult a physician, and it is cited as the most common symptom in Iraq and Afghanistan Veterans returning from deployment when they first visit VA for care.

ABOUT PAIN MANAGEMENT

- Nearly 40 million American adults experience severe pain, and an estimated 25.3 million had pain every day over a three-month period, an NIH [study](#) found.
- Chronic pain can cause disability, loss of work productivity, and increased health care costs.
- Unrelieved and persistent chronic pain contributes to depression, anxiety, poor sleep patterns, decreased quality of life, and substance use disorders.
- Medication is the most common treatment for both acute and chronic pain. For patients interested in treatments other than or in addition to medication, complementary and integrative medicine—such as acupuncture and yoga—is a popular option.

VA RESEARCH ON PAIN MANAGEMENT: OVERVIEW

- VA researchers are working to develop new approaches to alleviate Veterans' pain, which may result from spinal cord injury, burns, amputations, traumatic brain injury, cancer, or musculoskeletal conditions. Some types of chronic pain, such as the nerve pain experienced by many people with spinal cord injury, are very difficult to treat. VA research on pain covers a wide

range of topics, such as drug discovery and the impact of pain on daily function and quality of life.

- The [Center for Neuroscience and Regeneration Research](#), a collaboration between VA and its partners, conducts biomedical research that contributes to the scientific understanding of pain, especially nerve pain. The center is dedicated to molecular and cell-based discoveries on nervous system function.
- VA's [Pain, Research, Informatics, Medical Comorbidities, and Education](#) (PRIME) Center, part of the VA Connecticut Healthcare System, conducts research to improve pain care and sponsors education activities for Veterans and clinical staff.
- The [Chronic Pain Rehabilitation Program](#) at the James A. Haley Veterans Hospital in Tampa, Fla., is a nationally known center for chronic pain research, treatment, and education. The CPRP offers inpatient and outpatient rehabilitation programs to help Veterans manage their chronic pain conditions.
- The [Pain Management and Patient Aligned Care CREATE](#) has three goals: to enhance Veterans' access to pain care, to use health information technology to promote better pain care for Veterans, and to build sustainable improvements in pain care.

- VA's [Stepped Care Model for Pain Management](#) gives clinicians the ability to assess and treat pain within a primary care setting, while enabling them to use other treatment options including specialized care and multidisciplinary approaches. The model is designed to ensure VA clinicians are fully trained in pain management techniques, that pain assessment is performed consistently throughout VA, and that Veterans receive prompt and appropriate treatment.

- VA researchers are working to better understand chronic low back pain in older adults through a series of [papers](#) and an NIH task force. As many as 40 percent of Veterans over 65 years old have chronic back pain.

SELECTED MILESTONES AND MAJOR EVENTS

- 1988** – Established a [chronic pain rehabilitation program](#) in Tampa, Fla., to help Veterans with chronic pain cope with their conditions
- 1988** – Distributed the first national [pain management strategy](#), which established pain management as a national VA priority
- 2003** – Mandated, in a VA [directive](#), that all patients be systematically screened for the presence and intensity of pain

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2009 – Established the [stepped care model for pain management](#) as VA's nationwide standard of pain care

2014 – [Announced](#), along with NIH, a five-year, \$21.7 million quality-improvement initiative to explore non-drug approaches to managing pain and related health conditions

2015 – [Found](#) that ion channels—specialized proteins in the membrane of brain cells—are heavily implicated in the biological mechanisms that generate and sustain neuropathic pain

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Patients on higher opioid doses are at greater risk of suicide** than those on lower doses, according to researchers in the VA Ann Arbor Healthcare System and their colleagues. Providers may want to view high opioid dose as a marker of elevated suicide risk, suggest the researchers. ([Pain](#), Jan. 5, 2016)

- **Researchers in the Southeast Louisiana VA Health Care System and their colleagues developed new pain medications called endomorphin analogs.** This type of medication produced fewer and less dangerous

side effects than pain medications such as morphine in an animal study. The promising findings, though preliminary, suggest that endomorphin analogs may reduce the instances of abuse, respiratory depression, motor impairment, tolerance, and glial activation in patients with acute and chronic pain. ([Neuropharmacology](#), Dec. 31, 2015)

- **Repetitive transcranial magnetic stimulation decreases persistent daily headache pain in Veterans with mild traumatic brain injury.** A study at the VA San Diego Healthcare System found that transcranial magnetic stimulation resulted in more than 50 percent headache intensity reduction one week after treatment. Headache is one of the most common chronic pain conditions in active duty personnel and Veterans with mild traumatic brain injury. ([Neuromodulation](#), Nov. 10, 2015)

- **In a pilot study, researchers at the Durham VA Medical Center and Duke Integrative Medicine Clinic found that Swedish massage is feasible and effective for reducing pain caused by knee osteoarthritis.** If these results are confirmed by a larger study, massage could become an important part

of regular care for pain. ([Journal of Alternative and Complementary Medicine](#), June 2, 2015)

- **A panel led by VA researchers developed an algorithm and supportive materials to guide the care of older adults with hip osteoarthritis,** an important contributor to chronic lower back pain. The report was the first in a series designed to examine the multiple causes of lower back pain in older adults. ([Pain Medicine](#), May 1, 2015)

- **Implementation of the Opioid Safety Initiative in the Minneapolis VA Health Care System led to a significant reduction in high-dose opioid prescribing.** Setting dosing limits and establishing patient assessment and treatment guidelines improved the quality and consistency of prescription practices, say the researchers. ([Pain Medicine](#), May 1, 2015)

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

Nearly 40 million American adults experience severe pain, and an estimated 25.3 million had pain every day over a three-month period, an NIH study found.

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VA research on
PARKINSON'S DISEASE

Parkinson's disease (PD) is a disorder of the central nervous system, characterized by the death of dopamine-producing cells in the brain.

ABOUT PARKINSON'S DISEASE

• PD causes a variety of “motor” symptoms (symptoms related to movement of the muscles), including rigidity, delayed movement, poor balance, and tremors. Non-motor symptoms of PD include sleep disturbances, urinary dysfunction, constipation, swallowing problems, mood disorders, and cognitive deficits.

• The exact cause of PD is unknown. Most researchers agree that the disease is caused by both genetic and environmental factors, and by interactions among these factors.

• NIH estimates that the disease affects at least 500,000 Americans, mostly people over age 50. The average age of onset is about 60. There is no cure for PD; however, many effective medications and treatment options are available.

• In 2010, VA recognized PD as associated with exposure to Agent Orange or other herbicides during military service. Veterans with PD who were exposed to herbicides during their service may be eligible for disability compensation and health care.

VA RESEARCH ON PARKINSON'S DISEASE: OVERVIEW

• In 2001, VA created six specialized [centers](#) to provide Veterans with PD with state-of-the-art clinical care, education,

research, and national outreach and advocacy. Known as the Parkinson's Disease Research, Education, and Clinical Centers (PADRECCs), they are located in Philadelphia; Richmond, Va.; Houston; Los Angeles; San Francisco; and the Seattle/Portland area.

• The centers also provide comprehensive diagnosis and treatment services for other movement disorders, including essential tremor, restless leg syndrome, dystonia, Lewy body disease, progressive supranuclear palsy, multiple system atrophy, and corticobasal degeneration.

• Researchers at these sites are studying the biochemical pathways involving dopamine, and testing a variety of treatment approaches, including medication, surgery and electrical stimulation. Biomedical and clinical studies on PD are ongoing at many other VA sites as well.

SELECTED MILESTONES AND MAJOR EVENTS

2001 – Created [Parkinson's Disease Research, Education, and Clinical Centers](#) (PADRECCs), at six sites throughout the nation

2003 – Initiated a landmark [clinical trial](#) to assess the effectiveness of deep brain stimulators (DBS) for PD

2009 – [Determined](#) that DBS may hold significant benefits for those with PD who no longer respond well to medication alone

2014 – [Found](#) that walking is a safe and easily accessible way to improve PD symptoms

2015 – Developed a [procedure](#) to convert skin cells into dopamine neurons

RECENT STUDIES: SELECTED HIGHLIGHTS

• **Deep brain stimulation (DBS) is a surgical procedure used to treat a variety of disabling neurological symptoms, especially those related to PD.** Researchers from two VA Chicago-area hospitals and three schools of medicine in the area found that 6 to 12 months after DBS surgery, patients whose neurostimulator (a surgically implanted, battery operated device that delivers electrical stimulation to targeted areas in the brain that control movement) was implanted in their brains' subthalamic nucleus had a significantly greater increase in their use of medication for mental health issues than those whose neurostimulator was implanted in their brains' globus pallidus internus. The study found no significant differences in the two groups' use of outpatient or inpatient health care. ([Journal of Parkinson's Disease](#), 2015)

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• **Patients who walk briskly for 45 minutes, three times a week, show improvements in their Parkinson's symptoms**, according to a study by researchers with the Iowa City VA Health Care System and the University of Iowa. They were also less depressed and less tired. According to researchers, even moderate walking can make a significant difference in improving PD symptoms. ([Neurology](#), July 29, 2014)

• **Low-intensity workouts, stretching, and resistance exercise all improved the mobility of patients with Parkinson's disease** in a VA and University of Maryland study. Those who walked on a treadmill at a comfortable pace for nearly an hour showed the most consistent improvement in gait and mobility. ([JAMA Neurology](#), February 2013)

• **Up to 60 percent of PD patients experience psychosis** (a mental disorder characterized by symptoms that indicate impaired contact with reality) at some point during their illness. Physicians commonly prescribe antipsychotic drugs to treat the

condition. A study led by researchers at the Philadelphia VA, the VA Ann Arbor Healthcare System, and the University of Pennsylvania found that those who began using antipsychotic drugs while being treated for PD were more than twice as likely to die during the following six months, compared with a matched set of PD patients who did not use such drugs. ([JAMA Neurology](#), May 1, 2016)

• **VA researchers followed a cohort of patients with PD and baseline normal cognition skills** (the activities of thinking, understanding, learning, and remembering) for a minimum of two years and a maximum of six. The investigators, from the Corporal Michael J. Crescenz VA Medical Center in Philadelphia and the University of Pennsylvania, found that after one year, 8.5 percent of the patients had developed mild cognitive impairment, and by the end of six years the figure increased to 47.4 percent. All of the patients who had had mild cognitive impairment at the end of the first year developed dementia by the end of the

study. The research team concluded that the transition from normal cognition in PD patients to cognitive impairment, including dementia, occurs frequently and quickly. ([Neurology](#), Oct. 13, 2015)

• **The E4 variant of the apolipoprotein-E (APOE) gene is more common in people with dementia who have either PD, Alzheimer's disease, or Lewy body disease** (a neurodegenerative disorder that causes dementia), according to a nationwide team of VA researchers and their colleagues. In genetic studies of donated brain tissue, APOE was found in 7 percent of people without dementia. It was found far more often in Alzheimer's patients with and without Lewy body disease, people with only Lewy body disease, and patients with PD. ([JAMA Neurology](#), February 2013)

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

Most researchers agree that Parkinson's disease is caused by a combination of genetic and environmental factors

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Photo: Sgt. Pete Thibodeau.



VA research on

POSTTRAUMATIC STRESS DISORDER (PTSD)

In earlier wars, it was called “soldier’s heart,” “shell shock,” or “combat fatigue.” Today, clinicians recognize the issues described by each of these terms as a distinct medical condition called posttraumatic stress disorder, or PTSD.

ABOUT PTSD

- PTSD can occur after a traumatic event like combat, assault, or disaster. While stress is common after a trauma, for those with PTSD reactions such as reliving an event in their mind and feeling distant or angry do not go away over time, and can even get worse.
- While PTSD can affect people who have experienced a wide range of life-threatening events, in Veterans the condition is commonly associated with combat trauma. It has taken a significant toll on many war Veterans who currently use VA health care, including Iraq and Afghanistan Veterans. Military sexual assault or harassment can also lead to PTSD.
- PTSD also occurs after other types of trauma including terrorist attacks; serious accidents such as car wrecks; and natural disasters, such as fires, tornadoes, hurricanes, floods, or earthquakes.
- The disorder can lead to distressing and persistent symptoms, including re-experiencing the trauma through flashbacks or nightmares; emotional numbness; insomnia; relationship problems; sudden anger; and drug and alcohol abuse.

VA RESEARCH ON PTSD: OVERVIEW

- VA has a continuing commitment to fund

efforts to understand, prevent, and treat PTSD. The wide-ranging nature of current PTSD research includes studies of Veterans at large, subgroups of Veterans, families, and couples. Veterans of all eras are included in these studies.

- Ongoing studies range from investigations of the genetic or biochemical foundations of the disorder to evaluations of new or existing treatments.
- VA’s [National Center for PTSD](#) (NCPTSD) is a world leader in research and education programs focusing on PTSD and other psychological and mental consequences of traumatic stress. It currently consists of seven VA academic centers of excellence across the United States, with headquarters in White River Junction, Vermont.
- In 2013, VA and the Department of Defense (DoD) announced that the two departments together were committing more than \$100 million to fund [two new consortia](#) aimed at improving diagnosis and treatment of PTSD and mild traumatic brain injury. These organizations are bringing together leading scientists and researchers throughout the nation, and are part of VA and DoD’s response to an executive order to improve access to PTSD services for Veterans, service members, and military families.

SELECTED MILESTONES AND MAJOR EVENTS

- 1989** – Created the [National Center for PTSD](#) to address the needs of Veterans and other trauma survivors with PTSD
- 2007** – [Confirmed](#) the value of prolonged exposure therapy as a treatment for women Veterans with PTSD
- 2013** – Funded, along with the Department of Defense (DoD), two [consortia](#) to improve treatment for PTSD and mild TBI
- 2014** – [Found](#) that cognitive processing therapy (CPT) delivered via videoteleconferencing is as effective for PTSD as in-person therapy
- 2014** – [Found](#) that Veterans who sought and received care soon after the end of their service had lower rates of PTSD than those who waited to get treatment

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Four specific RNA molecules were found at lower-than-normal levels in Veterans who had TBIs along with PTSD** by researchers at the James J. Peters VA Medical Center in the Bronx and VA’s War-Related Illness and Injury Study Center in East Orange, N.J. RNA, or ribonucleic acid, is a nucleic acid present in all living cells. Its

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main role is to act as a messenger carrying instructions from DNA for controlling the synthesis of proteins. The molecules are known by the designations ACA48, U35, U55, and U83A. Veterans with only PTSD had significantly lower levels of only the U55 RNA molecule, and Veterans who only had a TBI and not PTSD had normal levels of all four molecules. The team hopes that their findings will eventually result in a simple blood test to help diagnose the two issues in Veterans. (*American Journal of Neurodegenerative Disease*, December 2014)

• PTSD symptoms can be significantly improved in Veterans who receive prompt mental health care.

Researchers at the San Francisco VA Medical Center found that Iraq and Afghanistan Veterans who sought and received care soon after the end of their service had lower levels of PTSD a year after they initiated care. For each year that a Veteran waited to initiate treatment, there was about a 5 percent increase in the odds of PTSD symptoms either not improving, or worsening. (*Psychiatric Services*, Dec. 1, 2014)

• Receiving psychotherapy and related services remotely can have positive effects on rural Veterans with PTSD.

A study at three VA medical centers looked at 266 Veterans, half of whom received care at either their local community-

based outpatient clinic or their nearest VA medical center. The other half received cognitive processing therapy through an interactive video hookup with psychologists based at the medical center. They also received calls from nurse managers and pharmacists and had psychiatric consultations via video chat. Participants in the telemedicine group were much more likely to engage in care for their PTSD and showed larger decreases in their symptoms. (*JAMA Psychiatry*, January 2015)

• Veterans with a combination of PTSD, depression, and military-related TBI had the greatest difficulties of all Iraq and Afghanistan Veterans

in getting around, communicating and getting along with others, self-care, and accomplishing other daily tasks. According to researchers with VA's Transactional Research Center for TBI and Stress Disorders (TRACTS), many Iraq and Afghanistan Veterans require highly integrative treatment approaches, and their health problems need to be dealt with in a comprehensive and coordinated manner. (*Journal of Traumatic Stress*, February 2015)

• Women who serve in combat are at the same risk of developing PTSD as men,

according to VA researchers and researchers with the University of California, San Francisco. The study

looked at more than 2,300 pairs of men and women deployed to Iraq and Afghanistan who were matched based on variables such as combat exposure, age, race, military occupation, marital status, and pay grade. After following the pairs for an average of seven years, the research team found that 6.7 percent of the women and 6.1 percent of the men in the study developed PTSD. The difference was not statistically significant. (*Journal of Psychiatric Research*, September 2015)

• According to VA's HealthVIEWS study of women Veterans, 20.1 percent of women who served in Vietnam have developed PTSD

either during or after their service. By contrast, 11.5 percent of those who served near Vietnam, and 14.1 percent of those who served in the United States have developed PTSD at some time during their lives. The results suggest that the mental health effects of Vietnam-era service among women Veterans are long lasting. (*JAMA Psychiatry*, November 2015)

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

The wide-ranging nature of current PTSD research includes studies of Veterans at large, subgroups of Veterans, families, and couples. Veterans of all eras are included in these studies.

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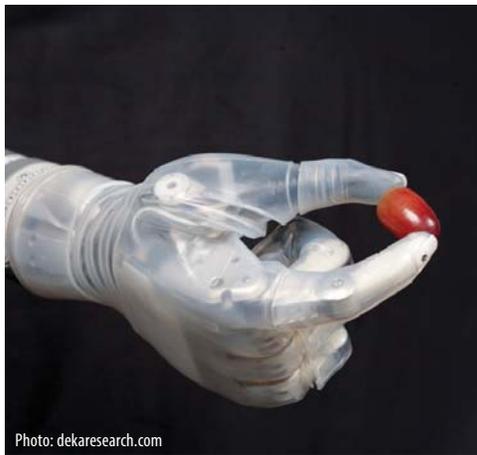


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VA research on PROSTHETICS

VA's Prosthetics and Sensory Aids Service is the largest and most comprehensive provider of prosthetic devices and sensory aids in the world.

ABOUT PROSTHETICS

- VA's involvement in providing prostheses to Veterans began in 1921, when the Veterans Bureau, a predecessor agency to the Department of Veterans Affairs, was given the responsibility to provide artificial limbs and appliances to World War I Veterans.
- VA provides a full range of equipment and services to Veterans. These range from items worn by the Veteran such as artificial limbs and hearing aids; to those that improve accessibility, such as ramps and vehicle modifications; to devices surgically placed in the Veteran, such as hips and pacemakers.
- The department has more than 70 [locations](#) at which orthotics and prosthetics are custom-fabricated and fitted, using state-of-the-art componentry. The American Board accredits each for Certification in Orthotics, Prosthetics and Pedorthics, the Board of Orthotic/Prosthetic Certification, or both.

VA RESEARCH ON PROSTHETICS: OVERVIEW

- To help meet the lifestyle and medical needs of Veterans who have lost limbs, VA researchers develop and test a wide variety of prosthetic devices. VA's goal is to offer Veterans prosthetics that will

restore them to their highest possible level of functioning within their families, communities, and workplaces.

- Some VA researchers are working on developing high-functioning artificial limbs that are very similar to their natural counterparts. Others are working on advanced wheelchair designs that promote mobility and independence for wheelchair users, and make it easier to use a wheelchair.
- Still other VA researchers are using functional electrical stimulation and other technologies to help those with weak or paralyzed muscles, and developing and testing state-of-the-art adaptive devices to help those with vision or hearing loss.
- Many of the latest innovations and discoveries in prosthetics research in the United States take place at VA centers. These centers generally work in close partnership with affiliated universities, and sometimes with other universities, as well as with commercial partners and other federal agencies.
- VA laboratories specializing in prosthetics development include the [Advanced Platform Technology Center](#), in Cleveland; the [Center for Functional Electrical Stimulation](#), also in Cleveland; the [Human Engineering Research Laboratories](#) in Pittsburgh; the [Center of Excellence for Limb Loss Prevention and Prosthetic Engineering](#) in

Seattle; and the VA [Center of Excellence for Neurorestoration and Neurotechnology](#) in Providence, Rhode Island.

SELECTED MILESTONES AND MAJOR EVENTS

- 1947** – [Introduced](#) the first mobility and orientation rehabilitation-training program for blinded Veterans
- 2007** – Unveiled the first [powered ankle-foot prosthesis](#), as part of a team with researchers at MIT and Brown University
- 2013** – [Reported](#) on new technology to help restore the sense of touch for those who have lost an upper limb and use an artificial hand
- 2014** – Published results of a [study](#) on how users and clinicians feel about the DEKA arm, the first prosthetic arm capable of performing multiple simultaneous powered movements
- 2015** – [Invented](#) a wheelchair allowing users to crank up the push rims to a standing position, providing them with increased functionality and independence
- 2015** – Began the first human [study](#) in the United States to investigate osseointegrated prosthetics, in which implants are firmly anchored in place by integrating implanted material in living bone

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2016 – [Determined](#) that knee replacement surgery could benefit some patients aged 85 and older

RECENT STUDIES: SELECTED HIGHLIGHTS

• **A 10-year trial of a surgically implanted electrical stimulation system for people with spinal cord injuries (SCIs)** was completed by researchers at VA’s Cleveland Functional Electrical Stimulation (FES) Center and Case Western University in 2015. By stimulating muscles, the system activates muscles to allow for standing, better balance, and exercise. A study of 15 people with SCIs who had received the system found that the patients had incorporated the neuroprostheses into their lives; that the system worked as well for patients after a year as it had when they first received it; and that the neuroprosthesis was safe and reliable to use. ([Archives of Physical Medicine and Rehabilitation](#), May 2012)

• **A method of knee replacement that uses MRI scans and special software to create customized cutting guides** that surgeons can use to prepare the bones surrounding the artificial knee was tested at the Phoenix VA Health

Care System. A research team found this knee replacement method provided much better pain relief and was more effective in restoring function and range of movement than other methods. Veterans in the study who received the knee in this manner were more than three times as likely to be pain-free two year after surgery, compared with those who received knees using other surgical procedures. Also, they were able to walk 50 feet further, on average, in the hospital before discharge. ([The Bone and Joint Journal](#), July 2014)

• **The DEKA advanced prosthetic arm is the first prosthetic arm capable of providing multiple simultaneous powered movements.** VA researchers and colleagues collected data on the DEKA arm over four years at four VA sites, and it is now approved by the U.S. Food and Drug Administration. In a 2014 study led by researchers from the Providence VA Medical Center and Brown University, 24 upper-limb amputees were fitted with a second-generation arm, and 13 were fitted with a third-generation arm, and were surveyed about their experiences. In all, 95 percent of Gen 2 users and 91 percent of Gen 3 users indicated that they were able to perform new activities

they had been unable to perform with their existing prosthetic device. ([Prosthetics and Orthotics International](#), December 2014)

• **BrainGate is a neural prosthesis that allows people whose arms and legs are paralyzed to control robotic arms or computer cursors with their thoughts.** It was developed by a research team of VA, Brown University, Harvard University, and Massachusetts General Hospital investigators in the 2000s. Recently, the research team found that advances in the system enabled those using it to acquire “targets” on a computer screen, such as letters on a keyboard, more than twice as quickly as before. Another study found that the system can allow point-and-click communication by people with locked-in syndrome, who are fully conscious but unable to move any muscles except for those that control eye movement. ([Science Translational Medicine](#), Nov. 11, 2015; [Neurorehabilitation and Neural Repair](#), June 2015)

For more information on VA studies on prosthetics and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

Some VA researchers are working on developing high-functioning artificial limbs that are very similar to their natural counterparts.

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Treating bacterial infections should therefore help improve their quality of life. ([Annals of the American Thoracic Society](#), March 2014)

• **Smoking marijuana is not as bad as smoking cigarettes when it comes to lung disease**, researchers with the Central Arkansas Veterans Healthcare System in Little Rock and the University of Arkansas have found. The team found a clear linkage between marijuana use and chronic bronchitis and large airway inflammation, conditions that make breathing difficult. However, they found no links to emphysema, a chronic disease in which the air sacs in the lungs are gradually damaged, and only weak, if any, links to lung cancer. The researchers concluded, however, that there is unequivocal evidence that habitual or regular marijuana use is not harmless, and that doctors should caution patients about possible lung damage from regular heavy marijuana use. ([Current Opinion in Pulmonary Medicine](#), March 2014)

• **Medical imaging techniques often used to diagnose lung cancer are not as good at detecting that cancer in regions where there is endemic infectious lung disease**, compared with regions where such disease is

not widespread. Positron emission tomography (PET) is a medical imaging technique that produces 3-D images showing differences between healthy and diseased tissue. PET commonly uses a radioactive tracer called FDG (fluorodeoxyglucose), so the test is sometimes called an FDG-PET scan. They are often used in combination with computed tomography (CT) scans. In regions where lung diseases like histoplasmosis and blastomycosis are common, these diseases may sometimes be mistaken for cancer on these imaging tests. ([Journal of the American Medical Association](#), Sept. 24, 2014)

• **An algorithm to help hospitals and public health officials determine the earliest stages of flu season** has been developed by researchers with VA and other health care institutions throughout the nation. The algorithm, called the Above Local Elevated Respiratory Illness Threshold (ALERT), uses routine information, such as the number of influenza cases confirmed per week in a region, to determine where and when the flu needs to be combatted. Having this information could help public health officials preserve resources while combatting the virus. ([Clinical Infectious Diseases](#), Feb. 15, 2015)

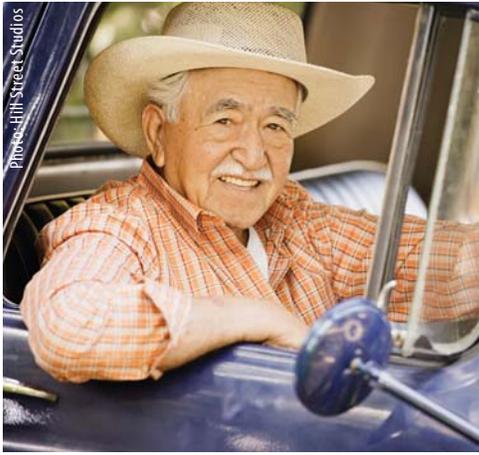
• **The standard dose of flu vaccine works just as well as a higher dose version** for patients between the ages of 65 to 84, according to researchers at the Philadelphia VA Medical Center and the University of Pennsylvania. However, for Veterans 85 and older, the higher dose was better in terms of avoiding hospitalization for the flu or pneumonia. ([Clinical Infectious Diseases](#), July 15, 2015)

• **Lung cancer screening can actually lower smokers' motivation to quit smoking**, according to investigators with the VA Puget Sound Health Care System and the University of Seattle. The team interviewed smokers who had just undergone lung cancer screening. Nearly half found some reason to believe that just being screened meant that they did not need to stop smoking. This assumption is false, as is the assumption many study participants had that lung cancer was the only potential lethal effect of smoking. ([JAMA Internal Medicine](#), September 2015)

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

VA researchers are advancing the understanding, prevention, and treatment of numerous respiratory illnesses, ranging from the common cold and pneumonia to major public health threats such as tuberculosis and lung cancer.

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VA research on
RURAL HEALTH

Many Veterans who rely on VA for their health care live in remote areas. Our nation's rural and highly rural Veteran population is large and dispersed. It is also racially, ethnically, and culturally diverse. Providing comprehensive, high-quality health care to these Veterans is a challenge.

ABOUT RURAL HEALTH

- Veterans are more likely to live in rural areas than Americans who did not serve in the military. While 18 percent of Americans live in rural areas, a quarter of Veterans do.
- More than half (57 percent) of rural Veterans enrolled in VA health care are 65 years old or older. In addition, 6 percent are women; 9 percent report being members of racial and ethnic minorities; and nearly 435,000 are Veterans of our recent conflicts in Iraq and Afghanistan. About 44 percent of rural Veterans have one or more service-related disabilities.
- Rural Veterans have lower average household incomes than other Veterans; they often face long driving distances to access quality health care; and there are fewer health care providers and nurses per capita in rural areas.
- VA's [Office of Rural Health](#) (ORH) strives to eliminate the barriers between rural Veterans and the services they have earned and deserve, thus improving Veterans' health and well-being by increasing access to care.

VA RESEARCH ON RURAL HEALTH: OVERVIEW

- In the past 10 to 15 years, VA has launched a number of initiatives to expand

and ensure access to high-quality health care for Veterans enrolled in the VA health care system who live in rural areas. VA researchers have been instrumental in these efforts by developing and evaluating new technologies, interventions, and models of care.

- Veterans who live in remote areas of the country have faced challenges in accessing VA care. VA researchers have focused on understanding these Veterans' health care needs, and on developing and evaluating new initiatives to fill the gaps. Some VA studies focus specifically on Veterans in rural areas, while others have a broader focus but explore issues or possible solutions that are relevant to rural health care.
- With support from the Office of Research and Development, a Collaborative Research to Enhance and Advance Transformation and Excellence (CREATE) [group](#), Improving Rural Veterans' Access/Engagement in Evidence-Based Healthcare, is working with VA's Office of Rural Health to ensure rural Veterans receive adequate levels of mental health care.

SELECTED MILESTONES AND MAJOR EVENTS

2011 - [Published](#) a systematic review of rural vs. urban ambulatory (outpatient) health care, a [reconceptualized model of access](#), and numerous articles on VA access

to rural health in a [special issue](#) of the Journal of General Internal Medicine

2013 - Established the [Improving Rural Veterans' Access/Engagement in Evidence-Based Healthcare](#) CREATE and several centers to research rural health

2013 - Established the [Charleston Health Equity and Rural Outreach Innovation Center](#) (HEROIC) to improve health outcomes among rural Veterans by examining the increasing role of technology in ensuring access

2014 - Published a [study](#) of the population demographics and health care needs of female rural Veterans enrolled in VA care

2015 - Established the [Virtual Specialty Care QUERI Program](#) and [QUERI for Team-Based Behavioral Health](#) to improve rural access to health care through technology

2016 - Established the [QUERI-Office of Rural Health Partnered Evaluation on Healthcare Resource Needs and Program Implementation for Rural Veterans](#)

RECENT STUDIES: SELECTED HIGHLIGHTS

- **Women Veterans living in rural and highly rural areas were older and more likely to be married than their urban counterparts**, according to a study of the population demographics and health care

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needs of female rural Veterans enrolled in VA care by VA's Office of Rural Health and the University of Colorado. Rural and highly rural Veterans were also less likely to visit VA for woman-specific care than were urban women Veterans. Those in highly rural areas were less likely to visit for mental health care, compared with urban women. ([Journal of Rural Health](#), Spring 2014)

• **A little extra assistance goes a long way in getting rural Veterans to take advantage of VA care and benefits**, according to investigators at the Tuscaloosa, Alabama, VA Medical Center. The researchers designed an outreach initiative that relies on motivational interviewing techniques and a 20-minute educational video. They visited local communities to let rural Alabama Veterans know about the health care services VA offers. Six months after the program ended, 87 percent of the Veterans who received an interview and saw the video had attended an appointment at the VA, compared with 58 percent of Veterans who only received visits from investigators. ([Journal of Rural Health](#), Spring 2014)

• **Mailing stool tests to Veterans' homes, instead of waiting for the**

Veterans to be screened during office visits, is an effective measure for preventing colorectal cancer, according to VA Iowa researchers. Approximately 1,500 Veterans who were overdue for colorectal screening were divided into three groups. One group received educational material in the mail; another was mailed the educational material and a fecal immunochemical test (FIT), which detects human blood in stool. The third group received neither the kits nor the educational material. Overall, 21 percent of the total FIT group underwent screens within six months of the mailing, while only 6 percent of each of the other two groups received colorectal cancer screens. ([Journal of Rural Health](#), Summer 2014)

• **Veterans using a videoconferencing weight-loss program tended to lose more weight than their non-participating peers**, according to a 2014 study by researchers from the Sioux Falls, Iowa, VA Medical Center. The researchers broadcast a series of VA's MOVE! weight-management classes live to 60 Veterans at community-based outpatient clinics (CBOCs) in South Dakota and Iowa, and their weight loss was compared to that of a group of Veterans who had declined treatment. Partici-

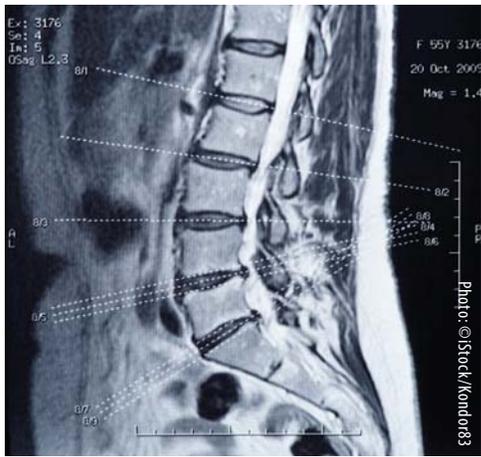
pants who attended at least 5 of the 12 classes lost, on average, 12 pounds more than those who did not. Moreover, they kept the weight off after a year. ([Journal of Rural Health](#), Winter 2014)

• **Receiving psychotherapy and related services remotely can have positive effects on rural Veterans with posttraumatic stress disorder (PTSD)**. A study at three VA medical centers looked at 266 Veterans, half of whom received care at either their local CBOC or their nearest VA medical center. The other half received cognitive processing therapy through an interactive video hookup with psychologists based at the medical center. They also received calls from nurse managers and pharmacists and had psychiatric consultations via video chat. Participants in the telemedicine group were much more likely to engage in care for their PTSD and showed larger decreases in their symptoms. ([JAMA Psychiatry](#), January 2015)

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

VA researchers have been instrumental in developing and evaluating new technologies, interventions, and models of care to help Veterans living in rural areas.

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VA research on SPINAL CORD INJURY

Spinal cord injuries (SCIs) impair the brain's ability to send messages to the rest of the body. These injuries can result in paralysis, loss of feeling, chronic pain, and other serious medical problems below the site of injury.

ABOUT SPINAL CORD INJURY

- The spinal cord is the main pathway for passing information between the brain and nerves that lead to muscles, skin, internal organs, and glands. Injury to the spinal cord disturbs movement, sensation, and function.
- SCIs are estimated to affect as many as 337,000 Americans, with about 12,500 new injuries occurring each year. About 80 percent of people with new injuries are males.
- Nearly half of all SCIs occur in people between the ages of 16 and 30, meaning many patients must live with the effects of these injuries for decades.
- VA treats more than 27,000 Veterans with SCI and related disorders each year, making the department the largest health care system in the world providing spinal cord care.

VA RESEARCH ON SPINAL CORD INJURY: OVERVIEW

- VA research focuses on returning motor and sensory function to Veterans with SCI. Researchers are working in the many fields, including neural engineering, wheelchairs and adaptive technology, treatment of SCI complications, new rehabilitation methods, and regenerative medicine.

- VA has played a major role in the development of BrainGate, a system that uses microelectrodes implanted in the brain to pick up neural signals. This system shows promise in allowing patients with SCI to control robotic devices and computer software systems using their brains.

- VA's [Center on the Medical Consequences of Spinal Cord Injury](#) is studying ReWalk, a wearable robotic exoskeleton that provides powered hip and knee motion to enable people with SCI to stand upright, walk, and turn.

- Researchers at VA's [Cleveland FES Center](#) completed a 10-year clinical trial to test a surgically implanted electrical stimulation system in people with SCI. In this program, electrodes are implanted in muscles, which allow electrically stimulated standing, better balance, and exercise. Studies show the system is safe and reliable for use.

- VA is part of the [Gordon Mansfield Spinal Cord Injury Translational Collaborative Consortium](#), a project to advance the field of regenerative rehabilitation. Regenerative rehabilitation aims to restore tissue and organ function lost as a result of aging, injury, or disease through techniques such as cell transplantation.

- The VA Rehabilitation Research and Development [Center for the Restoration](#)

[of Nervous System Function](#) is researching molecular and cell-based methods to alleviate pain and restore nervous system function in Veterans whose nerves have been damaged by SCI, multiple sclerosis, and diabetes.

- The [VA Center in Wheelchairs and Associated Rehabilitation Engineering](#) continually improves the mobility and function of Veterans with disabilities through advancing engineering and clinical research in wheelchair design and other mobility technologies.

- Researchers modified the VA [MOVE!](#) program to better suit the needs of Veterans with SCIs. They created pamphlets that include wheelchair fitness activities, safety tips for wheelchair users, and ideas to help SCI patients perform physical activity safely.

SELECTED MILESTONES AND MAJOR EVENTS

1988 – Established the [Center for Neuroscience and Regeneration Research](#) at the VA Connecticut Healthcare System

1989 – Established the [Cleveland FES Center](#) to focus on the application of electrical currents to generate or suppress activity in the nervous system

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1994 – Established the [Human Engineering Research Laboratories](#) in Pittsburgh

2002 – Conducted, in rodent models, the first [transplant](#) of myelin-forming cells that act as insulation around spinal cord nerves

2010 – Published a [study](#) showing that intravenously introduced bone marrow stem cells can protect an injured brain and spinal cord in rats

2010 – Established the [Gordon Mansfield VA Spinal Cord Injury Collaborative Translational Consortium](#)

2014 – Tested the [ReWalk](#) exoskeleton, which has received approval for sale and distribution from the Food and Drug Administration

2015 – [Demonstrated](#) that dendritic spine dysgenesis (an abnormality in nerve cells) following SCI results in spasticity and neuropathic pain

2015 – Contributed to the evidence base for VA’s decision to [provide](#) the ReWalk exoskeleton to eligible Veterans who will benefit from the new technology

RECENT STUDIES: SELECTED HIGHLIGHTS

• **Researchers at the VA Health Services Research and Development Center of Innovation on Disability and Rehabilitation Research and other VA centers found that vocational training** that engaged Veterans with SCI in job seeking and provided on-the-job support was more effective at helping Veterans find jobs than general vocational counseling that only involved job preparation. ([Topics in Spinal Cord Injury Rehabilitation](#), Feb. 6, 2015)

• **Evidence is lacking to support the benefits of upper-limb resistance circuit training on body composition in people with SCI**, according to researchers at the Hunter Holmes McGuire VA Medical Center and their colleagues. Further studies are needed to explore the effects of upper-body exercise on body composition after SCI. ([Aging and Disease](#), Aug. 1, 2015)

• **Neuropathic pain, or pain caused by damage to the nervous system, is a difficult-to-treat effect of SCI.** Researchers from the VA Connecticut Healthcare System and Yale University School of Medicine have identified through a review of animal-studies liter-

ature that changes in the dendritic spine structure are linked to neuropathic pain. Identifying specific causes of neuropathic pain in SCI may lead to more effective and long-lasting therapies. ([Neuroscience Letters](#), Aug. 5, 2015)

• **A patient with incomplete locked-in syndrome was able to communicate face-to-face with VA and affiliated researchers** using text-to-speech conversion and remotely with an Internet chat application through the BrainGate Interface System. This shows that intracortical brain-computer interfaces may be viable to help people with motor impairment communicate. ([Neurorehabilitation & Neural Repair](#), May 28, 2015)

• **A Dingell VA Medical Center and Wayne State University study found that people with SCI typically have moderate to severe sleep-disordered breathing.** Poor sleep quality is common in people with SCI, and better screening and treatment methods for sleep-disordered breathing need to be developed. ([Spinal Cord](#), Dec. 16, 2014)

For more information on VA studies on spinal cord injury and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

VA treats more than 27,000 Veterans with SCI and related disorders each year, making the department the largest health care system in the world providing spinal cord care.

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VA research on

SUBSTANCE USE DISORDERS

Substance use and abuse, with its associated health consequences, is a major public health problem.

Substance use disorders (SUDs) include dependencies on alcohol, illicit and prescription drugs, and nicotine.

ABOUT SUBSTANCE USE DISORDERS

• According to the Centers for Disease Control and Prevention (CDC), SUDs are a leading cause of death in the United States. Excessive alcohol use alone leads to about 88,000 premature deaths each year, and more than 480,000 deaths each year are caused by cigarette smoking.

• SUDs can develop in individuals who use alcohol or other addicting drugs in harmful quantities. According to the [VA/DoD Clinical Practice Guideline for the Management of Substance Use Disorders](#), about 9 percent of Americans over age 18 have a non-tobacco SUD, and about 1 in 4 Americans will develop a non-tobacco SUD over the course of a lifetime.

• In service members and Veterans, SUD commonly co-occurs with and complicates other conditions or issues. These conditions or issues may be health-related, such as other mental health conditions. They may also be societal, such as homelessness, criminal justice involvement, or unemployment.

• SUDs have substantial negative consequences on Veterans' mental and physical health, work performance, housing status, and social function. The department offers treatments for substance use problems throughout its health care system.

VA RESEARCH ON SUBSTANCE USE DISORDERS: OVERVIEW

• VA supports a broad portfolio of research looking at substance abuse prevention, screening, and treatment. Some researchers are looking at treatment-seeking patterns: why and when Veterans ask for help—and why many don't. Treatment strategies, including cognitive behavioral strategies and Web-based approaches, are also being studied.

• Other researchers are working to identify the most effective therapies for co-morbid disorders, such as depression and PTSD, and attempting to determine if early intervention improves outcomes. Still others are focusing on how readjustment issues relate to substance abuse.

• A Collaborative Research to Enhance and Advance Transformation and Excellence (CREATE) [group](#) is working to promote value and access in VA's SUD services. The group is doing so by validating and refining quality metrics; evaluating and disseminating low-cost, high impact innovations; and promoting patient and provider knowledge about evidence-based treatment for SUDs.

SELECTED MILESTONES AND MAJOR EVENTS

1956 – [Linked](#) cigarette smoking with precancerous lesions

1976 – Completed a comparison [trial](#) of two different types of methadone

1984 – Developed the [nicotine transdermal patch](#) and other therapies to help smokers quit

1992 – Published a [study](#) in which the drug Naltrexone was shown to be effective in keeping alcoholics from relapsing into heavy drinking and reduced cravings for alcohol

2013 – Successfully [tested](#) a vaccine to treat methamphetamine addiction on mice

2016 – [Developed](#), and tested on rats, a painkiller as strong as morphine that is unlikely to be addictive and has fewer side effects

RECENT STUDIES: SELECTED HIGHLIGHTS

• **For treating alcohol dependence, a 26-week primary care intervention is just as effective as specialty outpatient treatment**, according to VA researchers in Philadelphia. The study enrolled 163 Veterans and randomly assigned them to primary care treatment or specialty treatment groups. Those receiving primary care treatment were offered medicine and psychosocial support, delivered in person and by phone. The researchers found that Veterans in the primary care treatment group were more than five

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times as likely to complete all 26 weeks. Overall abstinence rates were the same between groups, and the primary care group had a smaller percentage of days with heavy drinking. (*Journal of General Internal Medicine*, January 2014)

• **Smoking marijuana is not as bad as smoking cigarettes when it comes to lung disease**, according to researchers from the Central Arkansas Veterans Healthcare System in Little Rock and the University of Arkansas. They found a clear linkage between marijuana use and chronic bronchitis and large airway inflammation, conditions that make breathing difficult. However, they found no links to emphysema, a chronic disease in which the air sacs in the lungs are gradually damaged, and only weak, if any, links to lung cancer. The researchers concluded, however, that there is unequivocal evidence that habitual or regular marijuana use is not harmless, and that doctors should caution patients about possible lung damage from regular heavy marijuana use. (*Current Opinion in Pulmonary Medicine*, March 2014)

• **Lung cancer screening can actually lower smokers’ motivation to quit smoking**, according to investigators with the VA Puget Sound Health Care System and the University of Seattle. The team interviewed smokers who had just undergone lung cancer screening. Nearly half found some reason to believe that just being screened meant that they did not need to stop smoking.

This assumption is false, as is the assumption many study participants had that lung cancer was the only potential lethal effect of smoking. (*JAMA Internal Medicine*, September 2015)

• **Most prescriptions for opioid painkillers are made by the broad swath of U.S. general practitioners**, not by a limited group of specialists, according to a study by researchers at the Palo Alto VA Health Care System and Stanford University School of Medicine. The research team examined Medicare prescription drug claim data, and found that while the top 10 percent of opioid prescribers account for 57 percent of all opioid prescriptions, this prescribing pattern is comparable to that found in the Medicare data for prescribers of all drugs. (*JAMA Internal Medicine*, February 2016)

• **Scientists know that alcohol itself can directly damage liver cells**. A 2016 study by researchers at the VA San Diego Healthcare System and the University of California yielded evidence that alcohol is harmful to the liver for a second reason—it allows gut bacteria to migrate to the liver, promoting alcohol-induced liver disease. According to the research team, alcohol appears to impair the body’s ability to keep microbes in check. When barriers break down, bacteria that don’t normally colonize the liver end up there—and this bacterial migration promotes alcohol liver disease. (*Cell Host and Microbe*, Feb. 10, 2016)

• **Specialized counseling delivered by telephone may be more effective than state quit lines to help smokers in mental health care kick the habit**. A team of researchers from the VA New York Harbor Health Care system and New York University found that specialized counseling yielded a quit rate of 26 percent at six months, versus 18 percent for the state quit lines. (*American Journal of Preventive Medicine*, April 2016)

• **Veterans receiving the highest doses of opioid painkillers are more than twice as likely to die by suicide**, compared with those receiving the lowest doses. Investigators with the VA Ann Arbor Healthcare System and the University of Michigan looked at nearly 124,000 Veterans who had non-cancer chronic pain and received prescriptions for opioids. They found that the suicide risk rose as dose increased. The researchers could not tell, however, whether there was a direct causal link between the pain medications and suicide risk. Instead, the high doses may be a marker for other factors that drive suicide, including unresolved severe chronic pain. (*Pain*, May 2016)

For more information on VA studies on substance use disorders and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

SUDs have major negative impacts on Veterans’ mental and physical health, work performance, housing status, and social function.

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VA research on SUICIDE PREVENTION

According to the Centers for Disease Control and Prevention, there were more than 41,000 suicides in 2013 in the United States, or 113 suicides each day. VA estimates that Veterans accounted for 18 percent of all deaths from suicide among U.S. adults.

ABOUT SUICIDE PREVENTION

- Veterans can be at risk for suicide for a variety of reasons. Some are coping with aging, stress, or lingering effects stemming from their military service that have never been addressed. Many have underlying mental health conditions, in some cases aggravated by their military service, that increase their risk. Many recently discharged Veterans have difficulty with their relationships or their transition back to civilian life.
- As part of its efforts to address this problem, VA has established a toll-free, confidential Veterans Crisis Line at **1-800-273-8255 (1-800-273-TALK)**. The hotline, staffed by mental health professionals 24 hours a day, seven days a week, has [received](#) more than 2.3 million calls (as of July 2016) since it was established in 2007. VA also offers a texting service at #838255.
- Veterans and their families can chat online with trained counselors at www.VeteransCrisisLine.net. Registration with VA or enrollment in VA health care is not necessary. VA also has full-time suicide prevention coordinators at each of its 144 hospitals.

VA RESEARCH ON SUICIDE PREVENTION: OVERVIEW

- Times of crisis can be related to chronic pain, anxiety, depression, sleeplessness, or anger, or disturbing memories of combat service. VA researchers are taking steps to protect at-risk Veterans from contemplating, attempting, and completing the act of suicide.
- Investigators are exploring risk factors for suicide in Veterans and helping to improve risk assessments. They are also working to develop effective interventions and to identify crucial time periods at which to intervene.
- Other researchers are developing national systems to capture and manage data relating to suicide, attempted suicide, and suicide reattempts among Veterans. These systems will help investigators determine risk and protective factors for suicidal behavior among Veterans.
- VA's Center of [Excellence for Suicide Prevention](#), located at the Canandaigua, N.Y., VA Medical Center, has a mission to reduce occurrences of suicide, primarily by studying and applying public health approaches to suicide prevention.

- VA's [Rocky Mountain Mental Illness Research, Education, and Clinical Center](#) studies suicide with the goal of reducing suicide in the Veteran population.
- VA is part of the [Military Suicide Research Consortium](#), a partnership that manages studies to increase knowledge on topics such as risk assessment, treatment, and prevention, as they pertain to suicidal behavior in the military and among Veterans.

SELECTED MILESTONES AND MAJOR EVENTS

- 2007** – Established a [Center of Excellence for Suicide Prevention](#) in Canandaigua, N.Y.
- 2012** – Completed a [report](#) providing data on suicides and attempted suicides among Veterans
- 2012** – [Found](#) that the experience of killing in war was strongly associated with thoughts of suicide
- 2016** – [Determined](#) that Veterans receiving high doses of opioid painkillers were more than twice as likely to die by suicide than those receiving low doses
- 2016** – [Announced](#) a series of actions to reduce Veteran suicide, including using data on suicide attempts and overdoses to guide prevention strategies

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RECENT STUDIES: SELECTED HIGHLIGHTS

• **Changes in the levels of certain amino acids in the body may contribute to suicide risk**, according to Durham VA Medical Center researchers. The amino acids in question are important in regulating people's mood and behavior, although understanding their exact relationships to suicide requires further study. ([Military Medicine](#), May 2014)

• **Veterans with pain, traumatic brain injury (TBI), and posttraumatic stress disorder (PTSD) have no greater risk of suicide** than those who have PTSD alone. Researchers from the South Texas Veterans Health Care System found that the riskiest combination of conditions for suicide was PTSD, depression, and substance abuse. PTSD has by far the largest effect, and adding depression or substance abuse to PTSD significantly raises the risk of suicide over PTSD alone. ([American Journal of Public Health](#), February 2015)

• **A possible link between air pollution and suicide** has been uncovered by researchers at the VA Salt Lake City Health Care System and

the University of Utah. They found that the odds of completing suicide were 20 percent higher for people who had been exposed to increased levels of nitrogen dioxide in the two to three days before their deaths. In particular, men and those between 36 to 64 years of age experienced the highest risk of suicide following short-term air pollution exposure. ([American Journal of Epidemiology](#), March 1, 2015)

• **Non-suicidal self-injury, or purposely hurting oneself without conscious suicidal intent, is relatively common among Iraq and Afghanistan Veterans.** A study led by researchers at the Durham VA Medical Center indicated that of 151 Veterans of the two wars studied by the research team, 14 percent reported a history of such injuries—and those who deliberately hurt themselves were more likely to engage in suicidal behavior. ([Psychiatry Research](#), June 30, 2015)

• **Veterans receiving the highest doses of opioid painkillers are more than twice as likely to die by suicide, compared with those receiving the lowest doses.** Investigators with the VA Ann Arbor Healthcare System and the University of Michigan looked

at Veterans with non-cancer chronic pain who had received prescriptions for opioids. Using the National Death Index, the researchers identified 2,601 of these patients who died by suicide. They found that the suicide risk rose as dosages increased. The researchers could not tell, however, whether there was a direct causal link between the pain medications and suicide risk. ([Pain](#), May 2016)

• **Nearly 14 percent of Veterans reported they had experienced suicidal thoughts in the two weeks before being asked whether they'd had such thoughts**, according to a study led by VA's National Center for PTSD. The results of the study also indicate that higher levels of psychiatric distress, physical health problems, and a history of substance abuse predict chronic suicidal thinking, and that thoughts of suicide can come and go over time. ([Journal of Affective Disorders](#), June 2016)

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

VA researchers are taking steps to protect at-risk Veterans from contemplating, attempting, and completing the act of suicide.

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Photo: Roy Kaltschmidt



VA research on **TRAUMATIC BRAIN INJURY**

The Department of Defense estimates that 22 percent of all combat casualties from Iraq and Afghanistan are brain injuries. Traumatic brain injury is also a significant cause of disability outside of military settings.

ABOUT TRAUMATIC BRAIN INJURY

- Traumatic brain injury (TBI) can happen from a blow or jolt to the head, or from an object penetrating the brain. When the brain is injured, the person who has been injured may experience a change in consciousness that can range from becoming disoriented and confused to slipping into a coma. The person may also have a loss of memory for the time immediately before or after the event that caused the injury. Not all injuries to the head result in a TBI, however.
- TBI can involve symptoms ranging from headaches, irritability, and sleep disorders to memory problems, slower thinking, and depression. These symptoms often lead to long-term mental and physical health problems that hurt Veterans' employment and family relationships, and their reintegration into their communities.
- The severity of a TBI is determined at the time of the injury and is based on the length of the loss of consciousness, the length of either memory loss or disorientation, and how responsive the individual was after the injury.
- Most TBI injuries are considered mild, but even mild cases can involve serious long-term effects on areas such as thinking

ability, memory, mood, and focus. Other symptoms may include headaches, vision, and hearing problems.

- While most people with mild TBI have symptoms that resolve within hours, days, or weeks, a minority may experience persistent symptoms that last for several months or longer. Treatment typically includes a mix of cognitive, physical, speech, and occupational therapy, along with medication to control specific symptoms such as headaches or anxiety.

VA RESEARCH ON TRAUMATIC BRAIN INJURY: OVERVIEW

- Among the goals of VA researchers working in this field are to shed light on brain changes in TBI, improve screening methods and refine tools for diagnosing the condition, and develop ways to treat brain injury or limit its severity when it first occurs.
- Researchers are also designing improved methods to assess the effectiveness of treatments, and learning the best ways to help family members cope with the effects of TBI and support their loved ones.
- VA's [Translational Research Center for TBI and Stress Disorders](#) (TRACTS) conducts studies to understand the complex changes in the brain, thinking,

and psychological well-being that result from TBI and posttraumatic stress disorder (PTSD). These studies will lead to more understanding and better treatment options for returning Veterans with TBI and PTSD.

- The department's [Brain Rehabilitation Resource Center](#), at the Malcolm Randall VA Medical Center in Gainesville, Florida, develops and tests treatments to improve or restore motor, cognition, and emotional impairments that have been caused by brain disease or injury.

- At the Michael E. DeBakey VA Medical Center in Houston, the department has established a [Traumatic Brain Injury Center of Excellence](#) focusing on mild TBI.

SELECTED MILESTONES AND MAJOR EVENTS

- 2013** – Funded, along with the Department of Defense (DoD), two [consortia](#) to improve treatment for PTSD and mild TBI as part of the [National Research Action Plan](#)
- 2013** – [Learned](#) that, in mice, an artificial communication link inserted in the brain can restore functions lost as a result of TBI
- 2015** – [Found](#) that the blame and anger associated with the grief of caring for a

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loved one with a TBI may be related to inflammation

2015 – [Learned](#) that Veterans who were near to bomb blasts in Iraq and Afghanistan appear to experience faster brain aging

2016 – [Identified](#) the cerebellum as particularly vulnerable to repeated blast exposures

RECENT STUDIES: SELECTED HIGHLIGHTS

• **The cerebellum is particularly vulnerable to repeated blast exposures**, according to researchers with the VA Puget Sound Health Care System and the University of Washington. The investigators looked at brain scans from Veterans who had experienced an average of 21 mild TBIs each as a result of explosions. The more blasts they were exposed to, the more they showed lower levels of glucose metabolism, a marker of brain activity, in the cerebellum. The cerebellum is the area of the brain that coordinates and regulates muscle activity. ([Science Translational Medicine](#), Jan. 13, 2016)

• **The blame and anger associated with the grief of caring for a loved one with a TBI may be related to inflammation.** A study by researchers at the Edward Hines, Jr. VA Hospital in Hines, Ill., and Loyola University of Chicago examined grief and its association with inflammation in 40 wives or partners of Veterans with TBIs. The caregivers studied collectively reported levels of grief comparable to that of individuals who have lost a loved one. That grief was not associated with TNF-alpha or inflammation in general. However, higher levels of TNF-alpha were found in those caregivers who reported high levels of blame and anger associated with their grief. High levels of TNF-alpha are related to a variety of inflammatory-related health issues, including heart disease, cancer, and diabetes. ([Biological Research for Nursing](#), January 2016)

• **Veterans who were near bomb blasts in Iraq and Afghanistan appear to experience faster brain aging.** Researchers from TRACTS conducted specially designed brain imaging on Veterans who had been within 100 feet of bomb blasts. They found that even

in blasts that did not necessarily lead to concussion, those exposed showed brain aging in images designed to detect the “leakiness” and fraying of the white matter in the brain. Consequences of this brain aging in Veterans near bomb blasts could be increased rehabilitation time and an earlier need for health care for aging issues such as dementia. ([Brain](#), August 2015)

• **Veterans with a combination of depression, PTSD, and military-related TBI had the greatest difficulties of all Iraq and Afghanistan Veterans** in getting around, communicating and getting along with others, self-care, and accomplishing other daily tasks. According to TRACTS researchers, many Iraq and Afghanistan Veterans require highly integrative treatment approaches, and their health problems need to be dealt with in a comprehensive and coordinated manner. ([Journal of Traumatic Stress](#), February 2015)

For more information on VA studies on traumatic brain injury and other key topics relating to Veterans’ health, please visit www.research.va.gov/topics

TBI can involve symptoms ranging from headaches, irritability, and sleep disorders to memory problems, slower thinking, and depression. These symptoms often lead to long-term mental and physical health problems.

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VA research on
VIETNAM VETERANS

Vietnam Veterans are the largest cohort of American Veterans in terms of service era. While most Vietnam Veterans successfully readjusted to postwar life, a substantial minority have coped with a range of psychological and adjustment problems.

ABOUT VIETNAM VETERANS

- According to Congress, the United States' military involvement in the Vietnam War began in February 1961 and lasted until May 1975. Some 2.7 million American men and women served in Vietnam. During the war, more than 58,000 servicemen and women lost their lives.
- During the Vietnam War, the U.S. military used more than 19 million gallons of various herbicides for defoliation and crop destruction in the Republic of Vietnam. Veterans who served in Vietnam anytime during the period beginning Jan. 9, 1962, and ending May 7, 1975, are presumed to have been exposed to herbicides.
- VA established an [Agent Orange Registry](#) to study the health effects associated with exposure to herbicides such as Agent Orange. Veterans who served in Vietnam, or in other areas throughout the world where herbicide was sprayed, who are interested in participating in an Agent Orange Registry health exam should speak to the environmental health coordinator or patient care advocate at their local VA medical center.
- Congress established VA's [Vet Center](#) program in 1979, after recognizing that a significant number of Vietnam Veterans were still experiencing readjustment

problems. Today, the Vet Center program provides a broad range of counseling, outreach, and referral services to Vietnam Veterans, and to Veterans of other periods of armed hostilities after the Vietnam era.

VA RESEARCH ON VIETNAM VETERANS: OVERVIEW

- VA researchers have long recognized the importance of gathering reliable and generalizable information on Vietnam Veterans and those who served during the Vietnam era, in order to inform health care policies and practices. Investigators have carried out many studies of this kind, focusing on Vietnam Veterans' health and well-being. These studies include mental and physical health outcomes among both women and men.
- In 1983, VA collaborated with an external entity, the Research Triangle Institute, to conduct the [National Vietnam Veterans Readjustment Study](#) (NVVRS). Study researchers concluded that, across more than 100 indexes, the majority of Vietnam Veterans appeared to have successfully readjusted to postwar life, and the majority at the time of the study were experiencing few symptoms of psychological disorders.
- The NVVRS also revealed that a substantial minority of Vietnam-era Veterans were suffering from a variety

of psychological problems such as PTSD, and were experiencing a wide range of life-adjustment problems, such as marital trouble and work difficulties.

SELECTED MILESTONES AND MAJOR EVENTS

- 1986** – Launched the [Vietnam Era Twin Registry](#)
- 1988** – Completed the [National Vietnam Veterans Readjustment Study](#)
- 1991** – [Established](#) that, in Vietnam Veterans, there does not appear to be a causal relation between homelessness and military service, including exposure to combat
- 2009** – Initiated the largest health [study](#) ever of Vietnam-era women Veterans (CSP #579)
- 2014** – [Found](#) that Vietnam Veterans with PTSD have diminished health functioning and increased disability today, compared with those who did not develop PTSD
- 2016** – Launched the [Vietnam Era Health Retrospective Observational Study](#) (VE-HEROeS), a large-scale nationwide study to assess the health and well-being of Vietnam-era Veterans, and compare their health to that of their counterparts who did not serve in the military

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RECENT STUDIES: SELECTED HIGHLIGHTS

• **Veterans exposed to Agent Orange are not only at higher risk for prostate cancer than other Veterans, but are more likely to have aggressive forms of the disease.** A study by Portland VA Health Care System researchers was based on the records of 2,720 VA patients who had undergone an initial prostate biopsy. Prostate cancer was diagnosed in a third of the Veterans. The chance of finding cancer was 52 percent higher in those whose records indicated Agent Orange exposure. Exposure to Agent Orange raised the risk of high-grade versions of the disease by 75 percent. ([Cancer](#), July 1, 2013)

• **The rate of non-melanoma invasive skin cancer among a sample of men who joined the Agent Orange registry was about twice as high as among men of the same age in the general population, according to investigators at the Washington, D.C., VA Medical Center and the University of Texas M.D. Anderson Cancer Center.** The rate among the registry sample was 52 percent, with the risk reaching 73 percent among Veterans involved in spraying Agent Orange. The researchers found no increase of malignant melanoma, the most dangerous type of skin cancer. ([Plastic and Reconstructive Surgery](#), February 2014)

• **Women Vietnam-era Veterans had a lower risk of death from all causes combined** and from diabetes, heart disease, chronic obstructive pulmonary disease, and diseases of the nervous system, compared with other American women of their age. Data for this study came from The [HealthVIEWS: Health of Vietnam Era Women's Study](#), conducted by VA's Cooperative Study Program (CSP #579), which is a study of approximately 10,000 women who served in the U.S. military during the Vietnam War. ([American Journal of Epidemiology](#), March 15, 2014)

• **Vietnam Veterans with PTSD have diminished health functioning and increased disability today compared with those who did not develop PTSD**, according to researchers from VA's Seattle Epidemiologic Research and Information Center. The same was true for Veterans who saw combat, compared with those who did not. Data for the study came from VA's [Vietnam Era Twin Registry](#), consisting of approximately 7,000 identical and fraternal male twin pairs, both of whom served in the military during Vietnam. ([Quality of Life Research](#), June 2014)

• **More than 20 percent of women Veterans who served in Vietnam developed PTSD either during or after their service.** By contrast, 11.5 percent of those who served near

Vietnam, and 14.1 percent of those who served in the United States, have developed PTSD at some time during their lives. According to data from VA's HealthVIEWS study, the prevalence of PTSD for women who served in Vietnam was higher than previously documented, and Vietnam service significantly increased the chances of developing PTSD relative to service in the United States. ([JAMA Psychiatry](#), November 2015)

• **As they age, many combat Veterans confront and rework their wartime memories in an effort to find meaning and build coherence**, investigators with VA's National Center for PTSD have found. Through reminiscence, life review, and wrestling with issues such as integrity versus despair, they intentionally re-engage with experiences they avoided or managed successfully earlier in their lives. While some Veterans can navigate this process alone or with their friends, others may benefit from support groups even if a half-century has passed since their combat experience. ([Gerontologist](#), February 2016)

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

VA researchers have long recognized the importance of gathering reliable and generalizable information on Vietnam Veterans and those who served during the Vietnam era, in order to inform health care policies and practices.

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VA research on **VISION LOSS**

VA's extensive network of low-vision rehabilitation programs helps many blinded and low-vision Veterans improve their level of functioning.

ABOUT VISION LOSS

- VA's Office of [Blind Rehabilitation Services](#) estimates there are approximately 157,000 Veterans in the United States who are legally blind, and more than a million Veterans who have low vision that causes a loss of ability to perform necessary daily activities.
- Among Veterans who have served in Iraq and Afghanistan, blast-related brain injuries can be followed by vision problems such as blurred vision, double vision, sensitivity to light, and difficulty reading. VA estimates that as many as 64 percent of service members with traumatic brain injuries (TBIs) also have a vision problem.
- Throughout the nation, VA operates 13 [Blind Rehabilitation Centers](#) (BRCs). These are residential inpatient training programs that help Veterans adjust to their blindness. BRCs offer a variety of courses designed to help blinded Veterans achieve a realistic level of independence.
- The [Visual Impairment Center to Optimize Remaining Sight](#) (VICTORS) program complements existing BRCs to support Veterans who are not blind but have significant visual impairment. VICTORS provides rehabilitation through offering definitive medical diagnosis and functional

visual evaluation, prescribing low-vision aids and training Veterans in their use, and providing counseling and follow-up.

VA RESEARCH ON VISION LOSS: OVERVIEW

- VA research projects in the area of vision loss and vision restoration cover the entire spectrum of Veterans' needs.
- In addition to developing vision-restoring treatment, VA investigators are designing and improving assistive devices for those with visual impairments, as well as doing work on a number of innovative wayfinding systems to help Veterans with vision loss navigate in various environments and perform everyday tasks.
- Investigators are also developing more accurate and efficient methods of vision testing, and are studying the connections between injury and vision loss in eyes that have suffered no overt damage.
- VA's Atlanta-based [Center for Visual and Neurocognitive Rehabilitation](#) is focused on enhancing Veterans' health by conducting research on the rehabilitation of visual and related neurological impairments.
- Researchers at the [VA Center for the Prevention and Treatment of Visual Loss](#),

located at the Iowa City VA Health Care System, focus on the early detection of potential blinding disorders of the Veteran and general population. These include retinal disease, glaucoma, and TBI. Researchers at the center test new ways of determining early signs of disease progression and response to treatment. They also develop new treatments.

SELECTED MILESTONES AND MAJOR EVENTS

- 1947** – Developed the [first mobility and orientation rehabilitation training program](#) for blind persons
- 1948** – Established the first [Blind Rehabilitation Center](#) for Veterans in Hines, Ill.
- 1975** – Developed the [C-5 laser cane](#) to help blinded Veterans navigate
- 2003** – Conducted the first [tests](#) of electrical stimulation of the human retina using an implanted microelectrode array to help restore vision to patients with blindness
- 2013** – [Found](#) that more than 65 percent of Veterans with blast-induced TBIs had vision problems, and 77 percent had sensitivity to light

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RECENT STUDIES: SELECTED HIGHLIGHTS

- **Physical activity can protect eyes as they age**, according to researchers at the Atlanta VA Medical Center and Emory University. The researchers ran mice on a treadmill for two weeks before and after exposing the animals to bright light that causes retinal degeneration. They found that treadmill training preserved photoreceptors and retinal cell function in the mice. The exercised animals lost only half the number of photoreceptor cells as animals that spent the same amount of time on a stationary treadmill. The team believes their work may one day lead to tailored exercise regimens or combination therapies to treat retinal degenerative diseases. ([The Journal of Neuroscience](#), February 2014)
- **Two specific formulas of supplements containing high doses of zinc and other antioxidants can slow the deterioration of the eye's macula** (the central part of the retina). A research team from the Providence VA Medical Center and three universities examined 11 different supplements to see if they were prepared in accordance with either formula. None of the supplements precisely duplicated either one. The

team concluded that ophthalmologists should educate their patients on what to look for in supplements. ([Ophthalmology](#), March 2015)

- **Sensory problems are common among Veterans who have had TBIs.** Researchers from the Palo Alto VA Health Care System learned that perimetry (visual field testing) for Veterans with TBIs within two months of their combat blast exposure provides a reliable indicator of long-lasting vision problems. These tests also reveal high rates of visual-field deficits among those tested, indicating that blast wave forces may significantly affect both the eye and visual pathways. ([Ophthalmology](#), February 2016)

- **A study affirmed the quality of surgeries done by VA ophthalmologic residents.** Researchers with the VA Boston Health Care System looked at more than 4,200 cataract surgery cases at VA facilities throughout the nation, and found that Veterans who were operated on by residents had an overall significant improvement in visual acuity (the clarity of their vision) and visual function (the ability to discern forms, colors, and movement) compared with before their surgery, even if complications arose as a result of their procedure. Those who

had complications, however, showed a less marked improvement in their vision. Residents are medical-school graduates engaged in specialized practice under supervision in a hospital. ([Journal of Cataract and Refractive Surgery](#), March 2016)

- **The SightBook app allows patients to test their vision frequently on their smartphones** and share their test results with their designated physician in real time. A research team from the Miami VA Healthcare System and the University of Miami tested the accuracy of readings from SightBook compared with readings using a Snellen eye chart, the standard eye chart that is read at a distance of 20 feet; and with near card eye charts, which are designed to be read at shorter distances. They found that while there were discrepancies in results between each of the methods of testing visual acuity, the results from each method could be successfully reproduced, and that baseline SightBook acuity measures allow for future vision comparisons. ([Retina](#), May 2016)

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

VA investigators are designing and improving assistive devices for those with visual impairments, as well as developing innovative wayfinding systems to help Veterans with vision loss navigate in various environments and perform everyday tasks.

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2013 – Established the [Women Veterans Healthcare CREATE](#)

2014 – Held a [women' health research conference](#) focused on research-clinical partnerships to enhance intervention, impact, and implementation

2016 – Conducted the 6th systematic review of research evidence since 2006 related to the health and care of women Veterans ([Mapping the Evidence: Sex Effects in High Impact conditions for Women Veterans](#))

RECENT STUDIES: SELECTED HIGHLIGHTS

• **Women Veterans living in rural and highly rural areas are older and more likely to be married than their urban counterparts**, according to a study of the population demographics and health care needs of female rural Veterans enrolled in VA care by VA's Office of Rural Health and the University of Colorado. Rural and highly rural Veterans are also less likely to visit VA for woman-specific care than were urban women Veterans. Those in highly rural areas are less likely to visit VA for mental health care, compared with urban women. ([Journal of Rural Health](#), Spring 2014)

• **Women Veterans who undergo cardiac catheterization are more likely to be depressed** or have posttraumatic stress disorder (PTSD) than women who do not. They also tend to be younger and more obese than men undergoing the procedure and are also significantly less likely to have obstructive coronary disease, according to researchers with the VA Ann Arbor Healthcare System and the University of Michigan. Consequently, these women patients are less likely to have been prescribed heart medications. However, their long-term health outcomes are about the same as those of their male counterparts. ([Circulation: Cardiovascular Quality and Outcomes](#), March 2015)

• **Women Vietnam Veterans have a lower risk of death** from all causes combined and from diabetes, heart disease, chronic obstructive pulmonary disease, and diseases of the nervous system, compared with other American women of their age. VA's HealthVIEWS: Health of Vietnam Era Women's Study, conducted by VA's Cooperative Study Program (CSP #579) also found, however, that nurses who served in Vietnam have twice the risk of death from pancreatic cancer, and nearly five times the risk of brain cancer, compared

with nurses who served only in the United States. ([American Journal of Epidemiology](#), March 15, 2015)

• **Low dose aspirin can impair the ability of breast cancer cells to renew themselves.** Investigators at the Kansas City (Missouri) VA Medical Center tested breast cancer cells in mouse models, and found that a daily dose of low-dose aspirin almost halved tumor growth in the mice's tumors by altering the molecular signature in breast cancer cells—and those cells it failed to kill were unable to grow. The researchers believe that daily doses of low-dose aspirin may be effective both for patients after chemotherapy, and as a preventative measure. ([Laboratory Investigation](#), July 2015)

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

Deployment and post-deployment health research is now a major portion of the VA women's health research portfolio, extending VA's knowledge of the health care needs of women returning from Iraq and Afghanistan, as well as women still on active duty.

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