

JANUARY 2011

RESEARCH ADVANCES

DISCOVERY  INNOVATION  ADVANCEMENT



Afghanistan/Iraq

Women's Health

Prosthetics/Amputations

Mental Health

Tramatic Brain Injury

Obesity

Post-traumatic Stress Disorder (PTSD)

Alzheimer's Disease

Depression

Personalized Medicine

Vision Loss

Parkinson's Disease

Caregiving

Cancer

Diabetes

Osteoarthritis

Pain Management

Cardiovascular Disease

Hepatitis C

Mental Health

Kidney Disease

Substance Abuse

Hearing Loss

Infectious Diseases

Spinal Cord Injury



Veterans Health Administration

**Research
Development**

Improving





“The Department of Veterans Affairs has a legacy of extraordinary achievement in research and development. These achievements keep VA on the cutting edge of healthcare and ensure we can provide, to all generations of Veterans, the very best care and services which they have earned through their service to the Nation.”

– Eric K. Shinseki, Secretary, Department of Veterans Affairs

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VA Research & Development Program: Improving Veterans' Lives through Innovation & Discovery

For more than 85 years, the Veterans Affairs (VA) Research and Development program has been improving Veterans' lives. VA Research is unique in that it is the only research program focused entirely on conducting groundbreaking research to meet the full spectrum of Veterans' medical needs. The program benefits from being part of a comprehensive health care system with state-of-the-art electronic medical records. Through this dynamic combination, VA Research has become an acclaimed model for conducting superior bench-to-bedside research. The program is positioned to attract the best and brightest investigators, most of whom also work as VA clinicians, and is able to promote the quick translation of research findings into advances in care.

Offers a promise for a brighter tomorrow—Veteran-centric at its core, the program identifies needs in the treatment setting and brings them through the research process to application in as few steps as possible. In addition to improving Veterans' lives, VA Research improves the lives of Veterans' families and caregivers, and ultimately many others in the nation who benefit from VA's research advancements. One Veteran has said of the program, "Sometimes it works miracles."

Serves as a model of research excellence—Designed to take full advantage of its unique position within an integrated health care system with state-of-the-art electronic health records, VA Research is able to foster the development of patient-centered evidence for clinical care decision-making and serves as a model for conducting superior bench-to-bedside research.

Attracts exceptional investigators—The distinctive opportunity to conduct top-quality, pioneering research in an integrated health care system and also provide patient care draws the highest-caliber investigators to the program. VA investigators have won three Nobel prizes, six Lasker awards, and numerous other distinctions.

Fosters dynamic collaborations—While realizing the advantages of an intramural research program, the VA research program embraces its close affiliations with academic institutions and fosters strong collaborations with federal agencies such as the Department of Defense and the National Institutes of Health, private industry sponsors, patient-advocacy organizations, and disease-focused nonprofits. These partnerships allow VA Research to leverage resources, accelerate the translation of research findings into care, and strengthen the program's impact on the health of Veterans and the nation.

Priority Areas for Research

Examples of deployment-related priority areas:

- Traumatic brain injury
- Polytrauma
- Post-deployment mental health
- Prosthetics and amputation care
- Spinal cord injury
- Hearing and vision loss
- Pain management

Examples of priority areas related to Veterans' ongoing health needs:

- Neurodegenerative diseases
- Mental health
- Diabetes
- Heart disease
- Vision and hearing loss
- Substance abuse
- Access to care



Veterans Health Administration

Research & Development

Improving Veterans' Lives www.research.va.gov





Improving Veterans' Lives

Examples of VA Research Advances

The purpose of VA Research is to advance the health care and overall well-being of Veterans, with benefits to the entire nation, through innovation and discovery. The following examples illustrate some of the activities through which VA researchers have been accomplishing this goal:

- Using cutting-edge technology such as robotics and nanotechnology to create lighter, more functional prostheses that look, feel, and respond more like natural arms and legs.
- Gaining new knowledge of the biological roots of posttraumatic stress disorder and developing and evaluating effective PTSD treatments.
- Learning how to deliver low-level, computer-controlled electric currents to weakened or paralyzed muscles to allow people with incomplete spinal cord injury to once again walk and perform other everyday functions.
- Exploring new approaches to pain treatment that will help Veterans with burn injuries to persevere through rehabilitation and make optimal progress toward regaining function.
- Developing a system that decodes brain waves and translates them into computer commands to allow quadriplegics to perform daily tasks like using email or TV.
- Establishing a pharmacogenomics analysis laboratory to help advance personalized medicine for Veterans.
- Identifying genes associated with Alzheimer's disease and diabetes.
- Pioneering new home-dialysis techniques.
- Developing and testing the nicotine patch and other therapies to help smokers quit.
- Conducting research that has helped to increase pneumonia and influenza vaccination rates for Veterans with spinal cord injury.
- Using animal models of Alzheimer's disease to identify promising new targets for early-detection tests and new drug therapies.





Afghanistan/Iraq

VA's Office of Research and Development has implemented a comprehensive research agenda to address the deployment-related health issues of the newest generation of Veterans—those returning from operations Enduring Freedom and Iraqi Freedom (OEF/OIF), as well as those expected home from Operation New Dawn. In addition to exploring new treatments for traumatic brain injury and other complex blast-related injuries, VA researchers are examining ways to improve the delivery of health care services for these Veterans and promote their successful reintegration back into their families, communities and workplaces.

Examples of VA Research Advances

Helping Veterans readjust—An estimated 25 to 56 percent of OEF/OIF combat Veterans have difficulties assimilating back into civilian life, according to a survey by a Minneapolis VA team. Many reported increased substance use, anger problems, dangerous driving, and divorce. About 4 in 10 screened positive for probable posttraumatic stress disorder, and these Veterans were more likely to report difficulties and expressed interest in a greater variety of services. In the survey of more than 750 Veterans, nearly all expressed an interest in services or information to help with readjustment.

Risks and resilience—Why do some Veterans experience posttraumatic stress disorder (PTSD) while others do not? The Marine Resilience Study is seeking answers. Conducted by the VA San Diego Healthcare System in collaboration with the Marine Corps and Navy Medicine, the study plans to identify psychological, biological, social and environmental factors that predict resilience to, and risk for, PTSD and other stress illnesses. The study has been following about 2,500 combat Marines through a cycle of deployment to Iraq or Afghanistan, and for six months after they return home.

Long-term effects of blast shockwaves—In a study at the Puget Sound VA, sophisticated scanning technology showed long-term changes in the brain function of Iraq Veterans exposed to blast shockwaves. The scans found four brain areas that metabolized glucose at a slower rate than seen in study volunteers not exposed to blasts. This indicates impaired brain activity. The areas involved sleep, focus, language and emotion regulation.

Facts About OEF/OIF Veterans and Polytrauma

The changing nature of warfare poses new challenges to VA's health care system. Due to improved body armor and battlefield medicine, many troops are surviving injuries that in the past would have been fatal. These soldiers, however, are returning home with complex, multiple injuries. These "polytrauma" cases often include brain and spinal cord injuries, vision and hearing loss, nerve damage, burns, amputations, musculoskeletal injuries, infections, and emotional adjustment problems. From March 2003 through Sept. 30, 2010, VA had treated 811 OEF/OIF combat-injured Veterans in its four main polytrauma clinics. The VA polytrauma system of care also includes network sites and support teams around the nation (www.polytrauma.va.gov).





Alzheimer's Disease

Areas of focus for VA research on Alzheimer's disease include finding potential drug therapies for prevention and treatment, exploring the genetic and environmental causes of the disease, studying the best ways to provide long-term care, and evaluating new programs to support caregivers. Additionally, VA researchers are working to better understand the connection between Alzheimer's and other chronic diseases, such as diabetes.

Examples of VA Research Advances

Heart drugs may stall dementia—A team at the Bedford (Mass.) and Boston VA medical centers found that some drugs for high blood pressure may also help prevent or slow Alzheimer's disease. Their study, published in the *British Medical Journal*, included information from more than 800,000 older Veterans being treated for hypertension or heart disease. Those who took drugs called angiotensin receptor blockers, or ARBs, were 24 percent less likely to develop dementia, compared with Veterans taking other drugs. Veterans who already had Alzheimer's disease and were taking ARBs were half as likely to enter nursing homes, compared with those taking other heart drugs. ARBs block a hormone that narrows blood vessels, which could improve blood flow to the brain and affect cognition.

DHA supplements come up short in study—A clinical trial led by a researcher at the Portland VA Medical Center compared DHA supplements against placebo in 402 older people with mild to moderate Alzheimer's disease. Over 18 months, the treatment boosted blood and brain levels of DHA but did not slow the rate of change on measures of Alzheimer's symptoms. Brain scans showed that the daily two-gram DHA supplement—about the amount in eight ounces of salmon—also did not slow the rate of brain atrophy. DHA, abundant in the brain, is the most widely known of the omega 3 essential fatty acids. Studies have confirmed its benefits for the heart, but researchers are still exploring its potential to prevent or treat dementia.

Data bank for biomarkers—The Alzheimer's Disease Neuroimaging Initiative aims to find imaging, blood and fluid biomarkers for early detection and progression of Alzheimer's disease. A prominent brain-imaging expert at the San Francisco VA Medical Center leads the initiative. Begun in 2004, the project has resulted in a database of brain images and genetic, biomarker and clinical data—de-identified to protect privacy—that is available to scientists throughout the world.

Facts About Alzheimer's Disease

One of the most common forms of dementia is Alzheimer's disease. In this condition, nerve cells in the brain deteriorate, affecting thoughts, memory and language. Symptoms range from mild forgetfulness to the inability to perform basic everyday tasks. Alzheimer's is estimated to affect some 5.3 million Americans, and this figure is expected to triple by 2050. About 5 percent of men and women ages 65 to 74 have the disease, and nearly 50 percent of those age 85 and older may be affected. Alzheimer's and its medical complications are a leading cause of death in the U.S., with annual indirect and direct costs of care estimated at \$172 billion.





Cancer

VA has a broad array of research on cancers common in the Veteran population. These include diseases such as prostate, lung, colorectal, bladder, kidney, pancreatic, esophageal and breast cancer, as well as lymphomas and melanomas. VA researchers conduct lab experiments aimed at discovering the molecular and genetic mechanisms involved in cancer; epidemiologic studies looking at the causes of disease; clinical trials to evaluate new or existing treatments; and studies focused on improving end-of-life care.

Examples of VA Research Advances

Lab test may predict invasive breast cancer—The presence of three proteins in biopsied tissue may help to predict when a noninvasive type of breast tumor may lead to more serious, invasive cancer. Researchers with VA and the University of California, San Francisco, studied 1,162 women who had been diagnosed with ductal carcinoma in situ (DCIS). Over eight years, 170 of them went on to develop invasive breast cancer. The biopsies of women with invasive cancer were more likely to test positive for a set of three proteins. Other proteins predicted a recurrence of DCIS. More studies in this area could give women with DCIS personalized information about future risk, which would help tailor treatment options.

One drug, many uses—A drug that has shown promise in early clinical trials for at least three other cancers also may be effective against a common type of esophageal cancer, suggests a study at the Kansas City (Mo.) VA Medical Center. The study focused on 2-methoxyestradiol, or 2ME2, a naturally occurring derivative of estrogen that causes cancer cells to self-destruct. It also blocks the formation of new blood vessels that feed tumors. The researchers identified the molecular pathways through which the drug acts on Barrett's esophageal adenocarcinoma cells. This cancer affects fewer women than men, possibly because women's bodies produce more 2ME2.

Phone and Internet support—Pain and depression are common symptoms in people with cancer, but they often go undertreated. A collaborative "telecare" approach that involves the Internet and telephone calls can help patients cope with these issues, says a study at the Richard Roudebush VA Medical Center in Indianapolis. Researchers enrolled 405 cancer patients. About half got usual care. The other half regularly reported symptoms through phone messages or over the Internet. They also received phone calls from a nurse that provided information and encouragement. Each patient's oncologist evaluated the symptom information and used it to help make treatment decisions. Over 12 months, the "telecare" group had less pain and fewer symptoms of depression.

Facts About 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. Many factors can combine to increase the risk of cancer. These range from family history and genetic makeup to poor diet and exposure to radiation, air pollution and other toxins. The three 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 tissue. Common cancer symptoms include weight loss, fatigue, and pain.





Cardiovascular Disease

Areas of focus for VA research on cardiovascular disease include evaluating and developing new treatments, probing the genetic and lifestyle causes of cardiovascular disease, and developing new rehabilitation methods, especially for stroke. Studies range from biomedical lab experiments on animal models of heart disease to large, multisite clinical trials involving thousands of patients.

Examples of VA Research Advances

Heart attack on a chip—Researchers are testing a disposable microchip that can diagnose a heart attack in minutes. The chip senses molecules in saliva that are markers for a heart attack. Heart attacks currently are diagnosed with blood tests, which can take hours to complete, and echocardiograms, which miss the diagnosis in about a third of patients. Five hundred patients are being enrolled in the two-year study at the Houston VA. *Popular Science* gave the chip a “Best of What’s New” technology award in 2008.

Better preventive therapy—Gastrointestinal complications such as ulcers and internal bleeding are serious side effects of the anti-clotting drugs taken to prevent heart attack and stroke. VA researchers and others found that patients taking anti-clotting drugs who also took a drug for ulcer relief were less likely to have these complications. The trial included 3,761 patients and lasted six months. All patients took aspirin and clopidogrel (sold as Plavix); half were given the anti-ulcer drug as well, while the other half took a placebo.

Modeling impact of salt reduction—Reducing American’s sodium intake by about 10 percent would prevent more than one million strokes and heart attacks and reduce the nation’s medical costs by more than \$32 billion, according to a model by VA researchers from Palo Alto. In partnership with Stanford University scientists, they also modeled the effects of a tax that would raise the prices of salty foods. That scenario was expected to cut sodium intake by about six percent. The recommended daily sodium intake for an adult is 2,300 mg; the average U.S. adult consumes 3,900 mg, most of which comes from processed foods.

Comparing bypass methods—In a clinical trial involving 757 patients at 11 VA medical centers, coronary artery bypass surgery had similar outcomes whether doctors used the radial artery (from the forearm, wrist and hand) or the saphenous vein (from the leg) to reroute blood flow to the heart. Contrary to what many surgeons have come to believe, using the arm artery didn’t result in improved patency (the graft remaining open).

Facts About Cardiovascular Disease

Cardiovascular disease, also called heart disease, is an umbrella term for the diseases and conditions that affect the heart and blood vessels. These include stroke, heart attack, congestive heart failure, coronary heart disease and congenital heart defects. Cardiovascular disease is America’s number-one killer and the leading cause of hospitalization in the VA health care system. Modifiable risk factors for heart disease include smoking, high blood pressure, high cholesterol, obesity, lack of physical activity, and uncontrolled diabetes.





Caregiving

Caring for an injured, disabled or ill family member can entail emotional, physical and financial strain. To advance research in this field, 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 caregiver and Veteran health and wellness. Studies focus both on the short- and long-term needs of caregivers, as many of these individuals will provide care for years or even decades.

Polytrauma caregiving needs—A Minneapolis team has surveyed 565 families in the “Family and Caregiver Experiences with Polytrauma” (FACES) study. The study is yielding information on the current and long-term needs of family members and significant others caring for Veterans with polytrauma. The team also has developed the Family Care Map, a Web-based, user-friendly guide that lays out each stage of VA rehabilitation care and eases communication between families and VA health care professionals.

Online Alzheimer’s help—Researchers from the Greater Los Angeles VA have created an online education and support program for caregivers of Veterans with Alzheimer’s disease. It includes a website, streaming videos, online education and a discussion forum. Weekly online chat sessions involve caregivers and senior clinical staff, and monthly sessions include a psychiatrist. Previous studies suggest that such education and support may not only benefit caregivers but also lessen negative behaviors on the part of the care recipients with Alzheimer’s.

Caregiving in heart disease, cancer—The Ann Arbor VA is studying how caregiver support can be enhanced for patients with heart failure and patients undergoing chemotherapy for cancer. In both studies, patients choose a care partner, an adult who does not have to live with them. All patients will receive weekly automated phone calls and monitoring; some patients’ care partners will receive symptom information and structured opportunities to provide support. The team hopes to discover the impacts on caregivers, as well as on patient health and well-being.

Facts About Caregiving

According to the Family Caregiver Alliance, “*Informal caregiver* and *family caregiver* are terms that refer to unpaid individuals such as family members, friends and neighbors who provide care. These individuals can be primary or secondary caregivers, full time or part time, and can live with the person being cared for or live separately.” Estimates vary widely on how many Americans are now filling these roles for loved ones, but the Department of Health and Human Services estimates that up to 37 million U.S. adults will be caregivers by 2050, an 85 percent increase from 2000. The burden tends to fall disproportionately on women. Between the overall aging of the Veteran population and the influx of younger Veterans disabled in Iraq or Afghanistan—more than 90,000 service members have been seriously wounded or injured in the wars—the number of family members caring for Veterans has substantially increased in recent years.





Depression

As part of a comprehensive research agenda aimed at advancing the care of Veterans with depression, VA researchers are developing, testing, and implementing new models of primary care that do a better job of screening for and treating the disease. They are also studying ways to improve outcomes for Veterans affected by depression along with other conditions, such as heart disease or diabetes, and exploring the genetic and molecular roots of the condition, with the goal of developing more effective drugs.

Examples of VA Research Advances

Depression raises risk for heart disease—In a database study that tracked the health history of more than 350,000 Veterans over seven years, those with depression were at about 40 percent higher risk for heart attack, compared with those who did not have depression. The study also found that general anxiety and panic disorder posed a similar increased risk of heart attack. PTSD also increased risk, but to a lesser extent. Several studies have found links between depression or anxiety and heart disease, but researchers are still working to determine the exact nature of the relationship, and the extent to which treating these mental health disorders can stem heart disease.

Telehealth treatment—A four-year study is examining whether talk therapy through in-home videoconferencing can help to treat older Veterans who have major depression. The study includes 224 Veterans living in or around Charleston, S.C. After eight weeks of treatment, patients will be followed for 12 months. This type of “telepsychology” could bring specialized mental health services to the homes of elderly and rural Veterans, as well as to many smaller VA community-based outpatient clinics.

Electroconvulsive therapy underused—Electroconvulsive therapy (ECT), commonly known as “shock therapy,” is an established treatment for severe or treatment-resistant depression, but a study shows it may be underused. A VA team in Ann Arbor found that only 307 of 187,811 VA patients who had received a diagnosis of depression between 1999 and 2004 underwent ECT. African Americans, those living in the South or West, those living farther from VA facilities offering the treatment, and those with major medical problems aside from depression were less likely to receive the therapy. The reasons for some of the disparities are unclear, but the researchers say VA and other health systems should “work to provide equitable access [to] and more consistent use of this safe and effective treatment.”

Facts About Depression

Depression is one of the most common and costly mental disorders. Depression costs the U.S. more than \$80 billion per year, according to the Depression and Bipolar Support Alliance. The figure includes both direct health care costs and indirect costs, such as lost work days. Nearly one in five Veterans returning from Afghanistan or Iraq has symptoms of either major depression or posttraumatic stress disorder. While there are effective pharmacologic treatments and psychotherapies for depression, studies show that the condition is under-diagnosed. An untreated episode of depression may last several months, and most people with depression experience repeated episodes over their lifetime.





Diabetes

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 to improve outcomes for patients. In addition, VA researchers are working to develop better ways to prevent or treat diabetes, particularly in special populations such as the elderly, amputees, minorities, spinal cord injured patients, and those with kidney or heart disease.

Examples of VA Research Advances

Screening is cost effective—Early detection of diabetes and pre-diabetes would not only improve Veterans' health but also reduce health care costs, say Atlanta VA researchers. Their model projected costs over three years for 1,259 adults, using three screening methods. Costs for early detection plus treatment were less than the expected costs of treatment that would be given later on.

P2P support—Peer-to-peer support may be more effective than nurse support in controlling blood sugar in diabetic men. Ann Arbor VA and University of Michigan researchers compared outcomes for men who talked with a nurse versus those who talked with a peer in a group setting. In each case, the men talked about diabetes-related issues once a week. After six months, men in the peer group had better blood-sugar control than at the start of the study; those in the nurse-support group ended up with slightly higher sugar levels. In another VA study on peer support, based at the Philadelphia VA Medical Center, African American Veterans with diabetes served as peer mentors to other minority Veterans and were effective at helping their fellow Veterans manage the condition.

Leptin link—Researchers with VA and the University of Washington in Seattle learned that the brain is able to normalize high levels of blood sugar when there is enough leptin in the central nervous system. Leptin is a hormone that plays a key role in appetite and metabolism and has been of great interest to obesity researchers. In animal experiments, the VA and UW scientists observed that leptin action in the brain can drop blood sugar even when there is a severe shortage of insulin, the main hormone that transports sugar from the bloodstream into the cells. The new insight may eventually lead to new treatment strategies.

Facts About Diabetes

Diabetes is a chronic disease in which the body cannot either produce or properly use insulin, the hormone that brings sugar into the cells from the blood. About a quarter of the Veterans receiving care from VA have diabetes, and an even greater number are at risk due to overweight or obesity. Nearly 24 million people in the U.S. have diabetes, but 6 million of them don't know they have it. Another 57 million have pre-diabetes, a condition that puts them at high risk for diabetes. More than 90 percent of adults with the disease have type 2, or non-insulin-dependent, diabetes. Diabetes is the seventh leading cause of death in the United States.





Hearing Loss

VA researchers, engineers and clinicians are studying ways to prevent, diagnose, and treat hearing loss, addressing a wide range of technological, medical, rehabilitative and social issues. Much of VA's research in this area takes place at the National Center for Rehabilitative Auditory Research (NCRAR) in Portland, Ore (www.ncrar.research.va.gov). The innovative work at this site includes, for instance, a study on traumatic brain injury and auditory processing, and another on computerized auditory training for hearing aid users.

Examples of VA Research Advances

Cancer drugs linked with tinnitus—Two common anticancer drugs increase the risk for tinnitus, say NCRAR researchers. They studied 488 Veterans, some of whom were taking cisplatin or carboplatin for cancer chemotherapy. This group had a higher risk of tinnitus compared with those on other medications. The risk, though, did not increase in relation to the cumulative dose of the drugs, or number of days they were taken. Age and pre-existing hearing loss also did not influence the onset of tinnitus.

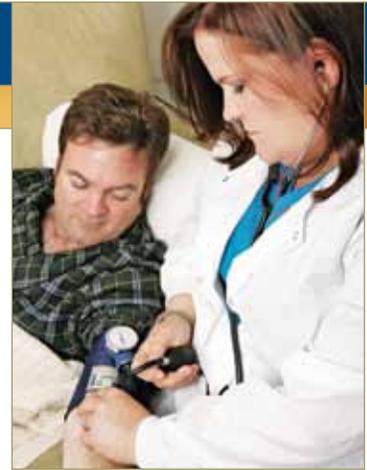
Screening boosts hearing aid use—Veterans who get routine hearing screening when they get other medical care are about twice as likely as other Veterans to be wearing a hearing aid one year later. Not surprisingly, those using hearing aids report dramatic improvements in everyday function. The results come from a study of 2,305 Veterans conducted by the VA Puget Sound Health Care System.

VA partners with Army—The NCRAR is collaborating with Walter Reed Army Medical Center to study central auditory processing—how the brain interprets incoming sounds—in soldiers who have been exposed to blasts. In addition to auditory tests, the researchers are analyzing medical records, details of the blast exposure, scores on overall tests of brain function, posttraumatic stress disorder measures, and other health data. VA and Department of Defense researchers have found that blast damage doesn't always lead to hearing loss per se. Even among blast-exposed Veterans with normal hearing, many report problems with understanding and processing spoken information.

Facts About Hearing Loss

Hearing loss affects some 28 million Americans, including more than half of those over age 75. The most common cause of hearing loss is exposure to harmful levels of noise, either in military or civilian settings. Other possible causes are allergies, infections, drugs, genetic factors, or simply aging. Some hearing loss can be reversed through surgery or medication. In other cases, hearing loss is permanent but can be helped through the use of hearing aids. Though almost all people with hearing loss could be helped by hearing aids, only about one in five uses them. Noise-induced hearing loss and tinnitus are among the most common disabilities affecting Veterans. In 2009, nearly 571,000 Veterans received compensation for hearing loss linked to their military service, and more than 639,000 Veterans received compensation for service-related tinnitus.





Hepatitis C

VA research on hepatitis C includes clinical trials of treatments, epidemiologic studies, investigations into the biological mechanisms of infection, and studies on improving quality of life for patients with this condition. Some recent studies have focused on boosting the rates at which Veterans with the condition receive antiviral treatment.

Examples of VA Research Advances

Statins improve response—Some cholesterol-lowering drugs may make antiviral drugs work better, particularly in HCV patients who also have diabetes. A research team at the Kansas City (Mo.) VA Medical Center studied about 8,300 hepatitis C patients, 1,700 of them with diabetes. Those who were also taking statin drugs had better responses to antiviral drugs for hepatitis C. The finding may help doctors tailor HCV care for patients.

Who sticks with treatment?—Antiviral drug treatment for hepatitis C typically lasts up to a year and has multiple side effects. Even if the drugs are working, many patients stop taking them. Seeking ways to reduce drop-out rates, researchers from VA's Puget Sound Health Care Center found that Veterans who also took hematopoietic growth factors were more likely to stick with treatment. These growth factors are proteins that boost blood-cell counts. They may help to reduce the anemia and fatigue that affect many patients. The researchers also found that Veterans with depression, substance use or diabetes were more likely to stop treatment too soon.

Self-management offers benefits—A six-week self-management program improved the health and quality of life of Veterans with hepatitis C in a San Diego study. VA researchers randomized 132 patients to either an information-only intervention or 12 hours of a self-management workshop. The workshop covered information about hepatitis C and taught problem-solving and self-management skills. After six weeks, patients in the self-management group knew more about their disease and were better able to manage it. They had more energy and tended to have better physical functioning and less health-related distress.

Facts About Hepatitis C

The liver disease hepatitis C is caused by the hepatitis C virus. It is spread through contact with infected blood or contaminated IV needles, razors, tattoo tools, or other items. Hepatitis C is particularly prevalent among Veterans, especially those who received blood transfusions prior to 1992. Between 4 and 17 percent of Veterans are infected, compared with 2 percent in the non-Veteran population. Most people with hepatitis C do not have any signs or symptoms of the disease for decades. By the time the disease is diagnosed, there can be significant damage to the liver, leading to complications such as cirrhosis and liver cancer, and sometimes resulting in death. Treatments using the protein interferon can be effective, but potential side effects such as mood disorders must be managed carefully.





Infectious Disease

One of the earliest contributions of VA researchers to medical science was the establishment of effective treatments for tuberculosis back in the 1930s and 1940s. Since then, VA scientists have helped advance the understanding, prevention, and treatment of numerous infectious diseases, ranging from the common cold to major public-health threats such as AIDS and influenza.

Examples of VA Research Advances

Shingles vaccine effective but underused—The latest results from a major clinical trial by VA and the National Institutes of Health confirmed that a new vaccine given to prevent shingles is safe over the long term. But other new research shows the vaccine is not being used widely in the United States—fewer than 10 percent of older people are receiving it—and that the incidence of shingles is rising. VA recently stepped up efforts to educate clinicians and patients about the vaccine. Shingles is a painful nerve condition that results from reactivation of the virus that causes childhood chicken pox. In 2005, VA and NIH researchers first reported, in the *New England Journal of Medicine*, that the vaccine cut the incidence of shingles by more than 50 percent and dramatically limited its severity and complications.

Reducing hospital pneumonia—A set of relatively easy changes could dramatically reduce the number of patients who come down with pneumonia after surgery, says a Palo Alto VA study. The changes include computerized reminders for doctors, special breathing exercises for patients, oral antiseptic swabs, extra training for nurses, and measures to improve patients' head elevation during meals and sleep. Pneumonia is the third most common post-surgery complication in the U.S. and can often be fatal.

HIV screening advances—Increasing the rate of rapid HIV testing in primary-care clinics is relatively simple, suggests a study from the VA Greater Los Angeles Health Care System. Nurses voluntarily enrolled in a workshop that taught how to administer the test, counsel patients and interpret results. Testing by nurses increased; the study also saw an unexpected increase in HIV blood testing by other clinical staff. These changes led to an overall 70-percent increase in HIV testing at the site over one year.

Facts About Infectious Diseases

Infectious diseases are generally classified according to the source of the infection. The major types are viral, bacterial, parasitic, and fungal. In the VA health care system, two viral diseases of special concern are HIV-AIDS and hepatitis C. VA maintains special websites devoted to these conditions: www.hiv.va.gov and www.hepatitis.va.gov. VA investigators are studying these and a wide range of other infectious diseases and working toward developing effective new preventive strategies, vaccines and drugs. In recent years, bioterror—the use of bacteria, viruses, or toxins to harm people—has become a concern for public health officials, and VA hospitals take part in a national program called BioSense to help track and investigate suspected bioterror events.





Kidney Disease

VA has a comprehensive research portfolio aimed at preventing and slowing the progression of chronic kidney disease and advancing the treatment of kidney failure. There are many causes of chronic kidney disease, but the two main causes—accounting for up to two-thirds of cases—are diabetes and high blood pressure. So in addition to studies directly on kidney disease, VA research on these two related chronic illnesses may also help reduce the prevalence of chronic kidney disease among Veterans.

Examples of VA Research Advances

Blood pressure predictions—A nighttime blood pressure reading may help predict which hypertensive patients are at risk for reduced kidney function and end-stage renal disease. Cleveland VA researchers examined medical records from 1,085 patients with high blood pressure. All were hospitalized and had blood-pressure readings taken at night. Those with higher systolic readings tended to be at greater risk over the next four years for reduced kidney function and end-stage renal disease, as well as heart attack and death.

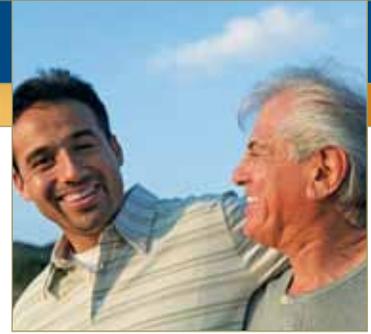
Depression worsens outcomes—Depression is associated with poor outcomes in kidney disease, according to VA researchers in Dallas. The study included 267 patients who were followed for one year. About 20 percent had major depression. Those with depression were at higher risk for hospitalizations and death. They also were more likely to have dialysis started during the follow-up year. Having more serious kidney disease or having other health problems did not factor into the risk from depression.

Preserving quality of life—Pain, depression and sexual dysfunction are some of the most common and troublesome symptoms in people on hemodialysis. These symptoms can easily go untreated, often because health care providers are not aware of them. A three-year study by Pittsburgh VA researchers is comparing two strategies in 245 patients. Some patients will have feedback about their symptoms given to their dialysis provider, along with treatment guidelines. Other patients will work with a nurse to identify symptoms and facilitate treatment. Researchers will collect data on symptoms for six months, and then compare the two strategies over the next year.

Facts about Chronic Kidney Disease

The kidneys are a pair of bean-shaped, fist-sized organs located on either side of the spinal column. Kidneys perform life-sustaining functions that keep the rest of the body in balance, such as helping to remove waste and excess fluid from the body, regulating water and minerals in the blood, and releasing vital hormones. As kidney disease worsens, complications such as high blood pressure, arteriosclerosis, anemia, weak bones and nerve damage can develop. If the disease progresses to kidney failure, when the kidneys shut down, dialysis or a kidney transplant is needed to maintain life. Currently, some 26 million adults in the U.S. have chronic kidney disease.





Mental Health

Major areas of focus for VA research on mental health include substance abuse, posttraumatic stress disorder, adjustment and anxiety disorders, depression, bipolar disorder, and schizophrenia. Researchers are studying and testing new drug therapies, enhancing collaborative care models in the primary care setting, and further improving access to mental health care through telehealth and other innovative approaches.

Examples of VA Research Advances

Treating bereavement—Complicated grief should be formally recognized as a mental condition, say VA researchers who are working on the best ways to treat it. The condition affects about 1 in 10 people after bereavement; instead of recovering with time, these people experience grief that intensifies and interferes with everyday life. A current trial is testing an antidepressant and a form of psychotherapy designed especially for dealing with complicated grief. The trial includes 440 adults, both Veterans and others.

Quetiapine for anxiety—In an international study that included 532 patients, including Veterans at the Charleston (S.C.) VA Medical Center, a drug used for other mental health conditions also dramatically reduces symptoms of generalized anxiety disorder. All took the drug quetiapine (known commercially as Seroquel) for 16 to 20 weeks. Then, half continued taking the drug while the other half took a placebo. The drug reduced the risk of anxiety symptoms substantially: Only 10 percent of people taking quetiapine had anxiety symptoms, compared with 39 percent of those taking placebo. Quetiapine currently is used to treat schizophrenia, bipolar disorder and depression.

Pharmacy program boosts adherence—An integrated pharmacy approach may benefit patients with serious mental illness, says a study from the Ann Arbor VA Medical Center. MedsHelp involves innovative packaging, a personalized refill service, and cooperation among health care professionals. Patients receive custom-made blister packs with medications already organized into days of the week and times of day. After 12 months, patients using MedsHelp were 20 percent more likely to be taking their medications as directed, compared with patients receiving usual care.

Facts About Mental Health

Mental health conditions such as depression and anxiety are common in the United States, with more than a quarter of Americans suffering from a diagnosable mental disorder in any given year. Mental health is a major focus for VA's healthcare system. A recent health survey of Iraq and Afghanistan Veterans enrolled in VA health care found that nearly 40 percent had at least one mental health diagnosis. Posttraumatic stress disorder was the most common, followed by depression. In addition to deployment-related mental health problems, schizophrenia is a major focus of VA clinical care and research, affecting some 100,000 VA patients and accounting for nearly 12 percent of VA's total health care costs.





Obesity

VA research on obesity examines the biological mechanisms of weight gain and weight loss; compares the safety and effectiveness of obesity treatments; and aims to identify strategies to prevent weight gain through exercise and healthy eating. These efforts complement VA's "MOVE!" program, a national weight-management and exercise program designed by the VA National Center for Health Promotion and Disease Prevention.

Examples of VA Research Advances

Comparing weight-loss methods—A low-carbohydrate diet and the weight-loss drug orlistat were equally effective at helping overweight and obese Veterans shed pounds. But the low-carb diet proved better at lowering blood pressure. The study of 146 men and women, conducted by VA and Duke University Medical Center, lasted nearly a year. Both the low-carb diet group and the orlistat group lost nearly 10 percent of their body weight. But nearly half of low-carb dieters were able to stop or decrease their blood pressure medication, while only about 20 percent of those in the orlistat group were able to do so.

No health-care bias—Some overweight or obese patients feel that their health-care providers are biased against them due to their weight, and some clinicians express negative attitudes toward obesity. But obese and overweight patients receive the same quality of health care as normal-weight patients, say Philadelphia VA researchers. Their study looked at two databases of information: one from Medicare beneficiaries (36,122 patients) and one from the VA system (33,550 patients). The study covered eight indicators of quality care, including cancer screenings, vaccinations and diabetes control tests.

Identifying risk in returning Veterans—An ongoing study at the VA Medical Center in West Haven, Conn., is examining patterns of change in body mass index (BMI) in Veterans returning from Afghanistan and Iraq. Researchers are creating a database to chart BMI changes over several years in a group of Veterans who used VA health care between 2001 and 2007. The study will identify risky periods for weight gain and develop tailored strategies to prevent it.

Gene therapy under study—A team at the Gainesville VA Medical Center and University of Florida found that transferring a gene that triggers the production of a polypeptide (a protein building block) called pro-opiomelanocortin into two sites in the brains of rats resulted in increased physical activity and fat-burning, and decreased body mass.

Facts About Obesity

Obesity has skyrocketed in the past four decades and reached epidemic proportions. Two in three Americans are overweight, and nearly one in three is obese. The problem may be even more severe among those who turn to VA for their health care, with one study finding that 68 percent of these Veterans were overweight and 37 percent obese. This trend has major implications for American health care, since obesity increases the risk of heart disease, high blood pressure, diabetes, arthritis and other diseases.





Osteoarthritis

VA researchers are working to understand the biological causes of cartilage degeneration and are testing new drugs and other medical and rehabilitative treatments for osteoarthritis. Among the VA sites conducting important work in this area is the Bone and Joint Rehabilitation Center of Excellence, based at the VA Palo Alto Health Care System.



Examples of VA Research Advances

Self-care eases pain—Getting people with osteoarthritis more actively involved in their own care reduces pain and increases function, says a study from the Durham VA and Duke University. The study involved 461 Veterans with osteoarthritis, half of whom received special educational materials and monthly telephone calls to review personal goals and action plans. After 12 months, this group had less pain than other study participants, who received either usual care or general education and support.

Racial gaps in joint replacement—Compared with whites, African Americans are less likely to receive knee or hip replacement as a treatment option for osteoarthritis. In a Pittsburgh VA study, 22 percent of eligible African Americans had the procedure, compared with 45 percent of whites. The difference was largely due to patient preference, rather than provider bias or other factors. VA centers in Pittsburgh and Cleveland are now recruiting 600 patients to test whether a culturally tailored educational video plus counseling helps to close the racial gap.

For more than just wrinkles—Botox injections aren't just cosmetic. A study by VA researchers in Minnesota and Alabama found that botulinum toxin injections had multiple benefits for people with chronic pain after knee replacement. Compared with sham injections, Botox relieved pain in more people and the pain relief lasted longer. The injections also improved physical function and reduced stiffness. Most patients in the study were men, and had lived with knee-related pain for an average of four to five years.

Shoulder surgeries compared—A review study by researchers at the Minneapolis VA and other institutions found slightly better outcomes for total versus partial joint replacement of the shoulder. The investigators noted, though, that more research is needed to further compare the two surgical approaches and to compare surgery with non-surgical treatment options.

Facts About Osteoarthritis

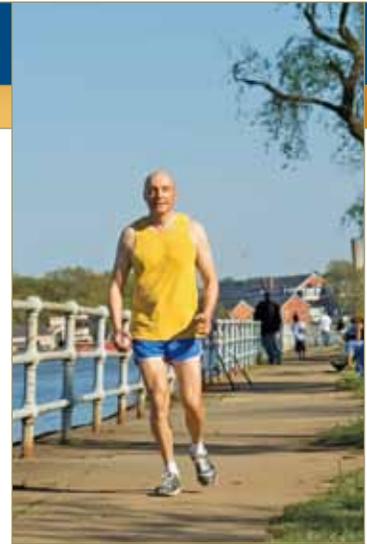
Osteoarthritis, or degenerative joint disease, is the most common form of arthritis. According to the Arthritis Foundation, it affects up to 27 million Americans, most of them elderly. Symptoms include pain, stiffness and swelling in the joints. Scientists once thought the disease resulted simply from “wear and tear” on the joints; now they are exploring a complex web of biological factors that may contribute to cartilage breakdown. Increasing concerns over the side effects of some analgesic drugs has underscored the need for research on the prevention of arthritis and alternative treatments approaches to pain management.





Pain Management

VA is working to develop new approaches to alleviate Veterans' pain, which may result from spinal cord injury, burns, amputations, traumatic brain injury, cancer, arthritis, or any number of other conditions. VA's research portfolio in this area covers a remarkably wide range of topics, from drug discovery to alternative treatments such as yoga or massage. VA investigators are also leaders in studying the impact of pain on daily function and quality of life.



Examples of VA Research Advances

Walking for back pain—An ongoing study in Ann Arbor is testing whether the Internet can help Veterans with chronic back pain. Those in the study will receive pedometers and take part in an educational program. One group also will have access to a website that helps users set goals and provides feedback, motivational messages and exchanges with an online community. The 12-month study will compare pain, function and exercise amounts between the groups. Exercise is one of the most effective strategies for back pain, but low-cost ways to help Veterans start and maintain an exercise program have not been widely studied.

Alternative care—An integrative outpatient health clinic provides benefits for those with a variety of pain conditions, according to VA researchers in Salt Lake City. The clinic's focus is on alternative and complementary medicine. In a study with more than 140 Veterans, the clinic was most effective for those with headache, joint pain and fibromyalgia: These patients saw long-term improvements not only in bodily pain, but also in depression and anxiety. Patients with back and neck pain also benefited, but their improvements were less extensive.

Insights on cancer pain—Scientists with VA and the University of Arizona discovered that nerve fibers surrounding tumors—once thought to be static—undergo an abnormal growth surge that amplifies cancer pain. The process resembles that seen in non-cancer syndromes that involve difficult-to-control pain. In their mouse experiments, the team also found that the biochemical culprit driving the pathological nerve sprouting is a protein known as nerve growth factor. When they “sequestered” the protein with an antibody, cancer pain lessened.

Facts About Pain

Pain is one of the most common reasons people consult a physician and is cited as the most common symptom in service members returning from combat. Research suggests that a quarter of Veterans who have returned from recent deployments report chronic pain that interferes with their daily activities—among the most common types, back pain from the weight of body armor and equipment and pain from traumatic nerve injury. In 1999, VA began requiring its doctors and nurses to consider pain as “a fifth vital sign,” to be routinely assessed and recorded along with blood pressure, pulse, temperature and breathing rate. Subsequent research, though, has raised questions about the effectiveness of this approach and explored other ways to ensure that pain symptoms are always recognized and addressed during medical encounters.





Parkinson's Disease

VA has six Centers of Excellence focused on Parkinson's disease, based in Houston, Philadelphia, Portland, Richmond, San Francisco, and Los Angeles (www.parkinsons.va.gov). Researchers at these sites are studying the biochemical pathways involving dopamine—a brain chemical implicated in Parkinson's disease—and testing a variety of treatment approaches, including medication, surgery, and electrical stimulation. Biomedical and clinical studies on Parkinson's disease are ongoing at many other VA sites, as well.

Examples of VA Research Advances

Immune genes implicated—Researchers with several institutions, including the VA Puget Sound Health Care System, found that a group of immune system genes may figure in the development of Parkinson's disease. The finding comes from a comparison of the genetic profiles of some 4,000 people, half with Parkinson's. The implicated genes are part of the human leukocyte antigen system, which is active in disease defense and some autoimmune diseases, such as type 1 diabetes and celiac disease. The findings are the strongest evidence yet of a role for the immune system in Parkinson's.

Deep brain stimulation helps long term—Electrical stimulation to either of two areas of the brain can improve Parkinson's symptoms and reduce the need for medication for as long as two years. A 13-center study of 299 patients compared deep brain stimulation in the subthalamic nucleus (STN) and in the globus pallidus (GPi). Over 24 months, both groups had better quality of life and improved motor symptoms. Medication needs were reduced in both groups, but the reduction was greater in the STN group. There were subtle differences between the groups in cognitive skills and mood. In deep brain stimulation, surgeons implant electrodes in the brain and run thin wires under the skin to a pacemaker-like device. Electrical pulses from the battery-operated device jam the brain signals that cause motor symptoms such as stiffness and tremors. Thousands of Americans have seen successful results from DBS, but questions have remained about which stimulation site in the brain yields better outcomes.

Major drug trial under way—Researchers at the Richmond VA Medical Center are involved in an 80-site study that will focus on the drug rotigotine for advanced Parkinson's disease. Four different doses of the drug will be tested. Rotigotine, which mimics the action of dopamine, is given through a skin patch. It was approved for early-stage Parkinson's disease in 2007.

Facts About Parkinson's Disease

Parkinson's disease is a disorder of the central nervous system resulting in rigidity of the muscles, delayed movement, poor balance, and tremors. It affects as many as 1.5 million Americans, mostly people over age 50. Some 50,000 new cases are diagnosed annually. VA treats more than 45,000 Veterans with this debilitating disorder each year. Parkinson's patients have a progressive loss of the brain chemical dopamine, caused by the death of dopamine-producing nerve cells. Experts suspect that a combination of genetic and environmental factors is responsible for this loss.





Personalized Medicine

VA's Office of Research and Development is at the forefront of developing safer, more effective treatments based on new knowledge about the role of genes in health and disease. The goal is to provide medical care that is personalized to the genetic makeup of individual Veterans. This approach is referred to as personalized medicine. Genomic analysis has already provided valuable insights into the origins of diseases that affect large numbers of Veterans, such as diabetes and cancer. Genomic analysis may also help predict Veterans' response to certain drug treatments. In early 2011, VA launched the Million Veteran Program (www.research.va.gov/mvp), a major initiative that aims to build one of the world's largest databases of genetic, military exposure, lifestyle, and health information. The goal is to improve the prevention and treatment of illness in Veterans and others.

Examples of VA Research Advances

Genetic testing for colon cancer—Genetic testing may help in the early detection and treatment of colon cancer, particularly in adults under 50. A new VA study is describing current patterns of colon cancer care that are informed by genomic information, and examining the best ways to incorporate personalized medicine into routine care for the disease. The three-year study, based at the San Francisco VA Medical Center, will be completed in 2013. In a separate initiative, VA Research helped launch a new training course for clinicians—both in and outside VA—on using genetic information to tailor screening and care for colorectal cancer.

Schizophrenia gene found—A gene on chromosome 5 is linked with schizophrenia risk in men, say VA researchers in the Bronx. Three forms of a gene called AMACR were linked with a doubling to near-tripling of risk for the disease. AMACR codes for an enzyme involved in the breakdown of fatty acids. Deficiencies in the enzyme cause changes in the brain's structure and function. Further work in this area could lead to prevention or treatment options targeted to AMACR.

Gene linked with worsening Alzheimer's—People with Alzheimer's disease who have a certain form of a gene called FAS are more likely to have faster-progressing disease. VA researchers in Portland, Ore., used information from a long-term study of healthy aging. They looked at 97 different forms of FAS, a gene that plays a role in cell death. One of the 97 forms was linked with faster Alzheimer's progression and smaller brain volume.

Facts About Personalized Medicine

With the completion of the Human Genome Project and other gene-mapping efforts, researchers have a detailed map of humans' genetic structure. Research is now focused on learning more about the role of specific genes, how they interact, and what activates or deactivates them. A common method of investigation is the "genome wide association study," in which scientists scan and analyze DNA from huge numbers of research volunteers to tease out which genes or genetic variations are linked to particular diseases or health traits. Investigators are also studying how to apply this knowledge to medical care, with the goal of customizing patients' care based on their individual genetic make-up.





Posttraumatic Stress Disorder

VA's Office of Research and Development supports numerous studies aimed at understanding, treating, and preventing posttraumatic stress disorder (PTSD). These studies range from investigations of the genetic or biochemical underpinnings of the disease, to evaluations of new or existing treatments, including large multisite clinical trials. One area of particular interest is using telehealth methods—such as videoconferencing—to bring evidence-based psychotherapy treatments to Veterans with PTSD who live in rural areas. In 2009, about 319,000 Veterans received treatment for PTSD in the VA health system.

Examples of VA Research Advances

Scanning for PTSD—Using magnetoencephalography (MEG), a noninvasive brain scan that detects the tiny magnetic fields created when brain cells “fire,” VA researchers in Minneapolis were able to distinguish between patients with and without PTSD better than 90 percent of the time. More than 70 Veterans with PTSD and 250 people with no mental diagnoses took part in the study. The differences in people with PTSD were seen as a distinct pattern of overactivity in the right temporal lobe. Veterans who had recovered from PTSD still showed the pattern, but not as strongly.

Prazosin for night symptoms—The drug prazosin has been shown effective for PTSD nightmares, and a recent analysis finds that Veterans are more likely to continue taking this drug than another one, quetiapine (sold as Seroquel), that is prescribed for the same symptoms. Researchers at the Tucson VA Medical Center compared medical charts from past studies in which Veterans took either prazosin or quetiapine. Both drugs generally worked for more than 60 percent of patients, but those taking quetiapine were only half as likely to continue taking it for the duration of the study. The researchers recommend that prazosin be used as a first-line therapy for PTSD sleep problems.

Blood chemical yields clinical clues—Blood levels of chemicals called neurosteroids predict PTSD symptoms and their severity, according to research from the Durham VA Medical Center and Duke University. One recent study included 90 Iraq and Afghanistan Veterans. It found that the lower the levels, the more severe were the symptoms of PTSD, depression and pain. Ongoing work is testing whether boosting neurosteroids levels can decrease PTSD symptoms.

Facts About PTSD

PTSD is a mental health problem that affects many people who experienced life-threatening events, such as combat, terrorist attacks, or a personal assaults. Symptoms include flashbacks, nightmares, depression and social withdrawal, as well as physical health changes. Treatment often includes anti-anxiety drugs or other medication along with psychotherapy. Current evidence-based psychological treatments for PTSD include prolonged-exposure therapy, in which patients recall their traumas in a safe setting and gradually learn to adjust their emotional response; and cognitive-processing therapy, a 12-session program that helps patients release the negative emotions linked to the trauma. Both treatments are used widely in VA, though experts continue to develop and test other approaches.





Prosthetics/Limb Loss

VA researchers are exploring the use of leading-edge technology such as robotics, tissue engineering, and nanotechnology to design and build lighter, more functional prostheses that look, feel and respond more like real arms and legs. They are also exploring new methods to improve and maximize the reconstruction of injured extremities. Additionally, researchers are evaluating existing devices and studying how best to match available prosthetic components to the needs of amputees—especially those who seek to maintain an active lifestyle and require versatile, high-performance prostheses.

Examples of VA Research Advances

Hand transplant outcomes tracked—A study based at the Atlanta VA will track outcomes of hand transplantation, a surgery that has been done only 10 times in the United States. Anyone between 18 and 55 who has lost an arm below the elbow is eligible for the study. The operation is available at the Atlanta VA and its affiliate, Emory University, and at a few other elite centers nationwide. Because of the surgery's complexity, it can take up to 16 hours—twice the time of the average heart transplant.

Bionic ankle now available to Veterans—A high-tech prosthetic foot-ankle called the PowerFoot is now available commercially and in the VA health care system. The device was developed in part through VA's Center for Restorative and Regenerative Medicine, a partnership among VA, Brown University and the Massachusetts Institute of Technology. The PowerFoot propels users forward using tendon-like springs and a battery-powered motor. It has two microchips and six sensors that evaluate and adjust the ankle's performance thousands of times per second. Studies have shown it reduces fatigue, improves balance and boosts overall activity levels.

Survey finds general satisfaction, despite health problems—Researchers surveyed 581 Veterans and service members with limb loss from the Afghanistan/Iraq and Vietnam eras. Most said they were satisfied with their current prostheses and rated their overall health as excellent or good. Many, however, reported problems such as phantom limb pain, residual-limb pain, back pain, and skin ulcers. Researchers are continuing to seek ways to help amputees cope with those issues.

Facts About Prosthetics and Limb Loss

The Department of Defense reports that more than 1,600 service members suffered limb loss between 2001 and September 2010. Many of these men and women are now in care in the VA system, along with Veterans of previous eras who suffered limb loss. Aside from combat injuries, foot ulcers caused by diabetes are another major cause of amputations: In the U.S., people with diabetes account for about two-thirds of all lower-limb amputations. VA has long been a world leader in prosthetics research and care, and is now in the forefront of developing and testing innovative prosthetic devices that take advantage of the latest advances in computer and robotics technology.





Spinal Cord Injury

VA researchers are studying the biological processes involved in spinal cord injury (SCI), in hopes of finding a cure. They are also working to develop better treatments and adaptive technologies for Veterans with SCI. Another focus of research is preventing the medical complications that often develop as a result of this disability. For example, VA investigators are developing microstimulators that help to prevent respiratory problems by recreating natural breath and cough patterns. Respiratory problems are the leading cause of death in patients with SCI.

Examples of VA Research Advances

Robotic wheelchair—Researchers at the Human Engineering Laboratories (HERL), a joint program of VA and the University of Pittsburgh, are building and refining a robotic wheelchair for quadriplegics. The Personal Mobility and Manipulation Appliance (perMMA for short) is basically a power wheelchair fitted with robotic arms. At the business end of the arms are grippers with force and temperature sensors. Various mechanisms are being studied to allow users to easily control the arms—such as voice commands, or a video-tracking system that follows head movements. The device could help with everyday tasks such as food preparation and switching on appliances. *Popular Science* named perMMA one of the 10 most advanced human-assistance robots in the world.

Consortium to speed research pace—The VA's new Spinal Cord Injury Collaborative Translational Consortium is building teams of leading investigators to nurture high-risk, high-return ideas that would likely not get funded through other programs. The consortium also will create synergy among scientists. Groups in West Haven, Conn., and San Diego plan to share data, techniques and experiments. The collaboration should propel research forward at a rapid pace. Areas of focus include the genetics of nerve regrowth, the use of growth factors, and adult stem cell research.

Comparing wound-healing methods —Researchers at 10 VA sites compared two methods for healing pressure ulcers—a common SCI complication in which the skin in the gluteal area becomes sore due to immobility. The trial involved 86 Veterans. It found equal results for standard wound care and a newer approach known as negative pressure wound therapy, in which clinicians apply suction to the wound. In a sub-analysis, though, the researchers found that those with poorer nutrient intake tended to respond more poorly to the newer technique.

Facts About Spinal Cord Injury

Spinal cord injuries 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. Spinal cord injuries are estimated to affect as many as 296,000 Americans, with 10,000 new injuries occurring each year. The average age at the time of injury is 39, so many patients live with the effects of these injuries for decades. VA cares for more than 25,000 Veterans with spinal cord injuries or disorders, making it the largest integrated health care system in the world providing spinal cord care.





Substance Abuse

A leader in the field of addiction research for decades, VA continues to support a broad portfolio examining substance-abuse prevention, screening and treatment, including studies aimed at understanding the genetic factors that may predispose people to alcohol or drug abuse and addiction. One area of particular focus is improving substance-abuse treatment for homeless Veterans.

Examples of VA Research Advances

Online smoking cessation—A study based at the Durham (N.C.) VA Medical Center is testing an Internet-based program for smoking cessation. More than 400 Iraq and Afghanistan Veterans are taking part. Half are being referred to a standard smoking cessation program. The others are offered nicotine replacement therapy plus premium membership to a website called QuitNet. The site features chat rooms, advice from experts, medication tips, buddy match-ups and other tools. Clinic-based smoking cessation programs can be effective, but lack of attendance is common and reduces success rates. Researchers hope the Web-based approach will be especially helpful for Veterans who live in rural areas.

Partnering with NIH—VA and the National Institutes of Health recently announced joint funding of more than \$6 million in new studies on substance abuse, most focused on returning Veterans. Some studies will look at why and when Veterans ask for help, and why many don't. Others will test treatments such as cognitive behavioral therapy or Web-based treatments. Yet other research will examine how men and women Veterans differ in their addiction behaviors.

Brief alcohol counseling effective—Current or recent substance use can exclude patients with hepatitis C from receiving antiviral therapy. A study at the Minneapolis VA found that even brief counseling for heavy drinking helped these patients reduce or stop using alcohol. About 50 patients received brief counseling from a medical provider and follow-up by a psychiatric nurse specialist. More than one-third stopped drinking altogether, and about one-fourth reduced the amount they drank by more than half.

Facts About Substance Use Disorders

Substance use disorders—a term that includes abuse of, and addiction to, alcohol, illicit and prescription drugs, and nicotine—are considered by many to be the nation's leading health problem, taking a huge toll on individuals and families and costing about \$414 billion each year. In the Veterans Health Administration, more than 448,000 Veterans seen in fiscal year 2009 had substance use diagnoses other than nicotine dependence. Due in part to aggressive efforts by VA in the area of smoking cessation, fewer Veterans in the VA system are smoking today than a decade ago. In 1999, the prevalence of smoking among Veterans in VA care was 33 percent, and in 2008, it was just under 20 percent—about the same as for U.S. adults in general.





Traumatic Brain Injury

VA researchers are conducting cutting-edge research aimed at improving care for Veterans with traumatic brain injury (TBI). VA research in this area focuses on gaining a better understanding of the brain changes that occur in TBI; refining screening and diagnostic tools; developing drugs to treat TBI, either long-term or immediately after an injury; helping Veterans with TBI reintegrate into the community; and identifying the best coping strategies for families.

Examples of VA Research Advances

“Smart Home” evaluated—Futuristic “Smart Home” technology is being evaluated at the Polytrauma Transitional Rehabilitation Program at the Tampa VA Medical Center. The interactive system uses sensors, tracking software and other technologies to provide memory cues, boost mobility and promote other clinical goals. Researchers describe the system as a “cognitive prosthetic.” Aside from improving round-the-clock safety, the system is expected to enhance rehabilitation and shorten recovery times.

Presidential award for TBI researcher—Dr. Pamela VandeVord, of the Detroit VA Medical Center and Wayne State University, was one of two VA researchers to receive Presidential Early Career Awards for Scientists and Engineers from President Obama in December 2010. Her lab studies have explored how blast-induced TBI damages neurons and other cells and tissues in the brain. The work promises to help identify new ways to assess and treat TBI.

New pairing of two known drugs—Erythropoietin and simvastatin (sold as Zocor) may provide a powerful combination therapy. Using a mouse model of brain injury, VA researchers in Chicago found that erythropoietin boosted the creation of new brain cells, while simvastatin helped to restore damaged cells and reduce inflammation. Each drug has been studied and used individually for other conditions, but this was the first research to examine their simultaneous use for brain injury.

Screening tool validated—A study involving 500 Iraq and Afghanistan Veterans at five VA sites in upstate New York confirmed that the screening questionnaire VA uses to help identify patients with TBI is reliable and valid. The researchers noted, though, that the presence of PTSD symptoms may reduce the accuracy of the TBI tool and highlights the need for careful follow-up of those who screen positive.

Facts About Traumatic Brain Injury

Traumatic brain injury (TBI) is estimated to affect some 20 percent of U.S. troops injured in Afghanistan or Iraq. The cause is usually an explosive. Most of the injuries are considered mild, but even these cases can involve serious long-term effects on areas such as thinking ability, memory, mood, and focus. Symptoms may also include headaches and vision problems. Treatment typically includes a mix of cognitive, physical, speech, and occupational therapy, along with medication to control specific symptoms, such as headaches or anxiety. According to the Defense and Veterans Brain Injury Center, nearly 196,000 troops suffered a traumatic brain injury between 2000 and June 2010.





Vision Loss

VA researchers are working to design new assistive devices for the visually impaired and to improve existing ones. They are also exploring the use of GPS and other technologies—such as infrared signals or computer vision—to aid indoor and outdoor navigation for blinded Veterans. Other areas of investigation include the development of an artificial retina to restore vision to those affected by macular degeneration or retinitis pigmentosa, and the design and evaluation of new tests and vision-therapy techniques to address vision problems associated with traumatic brain injury and posttraumatic stress disorder.

Examples of VA Research Advances

Cataract innovation—A team at the St. Louis VA Medical Center and Washington University is developing an auto-focusing artificial lens that turns from liquid to gel after being implanted in the eye. The lens could revolutionize treatment for cataracts, which normally involve surgery and replacement lenses that have limited focusing ability. The lens also could be used to correct nearsightedness and farsightedness.

Finding a way—VA researchers in Baltimore and Atlanta, with help from computer science students at the University of Maryland, College Park, are designing a computer vision system to help blind users with navigating indoors and outdoors, recognizing currency, and finding lost objects. For navigation, the system relies on a webcam that scans the environment and compares what it sees with preloaded still images of the area around the desired destination. Stereo audio signals to the user's headphones guide him to the target.

TBI and vision loss—Many Veterans with TBI can read an eye chart and pass a standard eye exam, but further probing reveals problems such as light sensitivity, blurred or double vision, trouble shifting gaze, headaches, eyestrain, inability to track a line of print, fatigue after short periods of reading, and hemianopsia, a condition in which half of the visual field in both eyes is lost, due to optic-nerve damage. At least 6,000 Veterans are affected. VA researchers in Palo Alto and Iowa City are developing enhanced eye exams and innovative forms of vision therapy to address these issues.

Facts About Vision Loss

There are some 157,000 Veterans in the United States who are legally blind, and more than one million Veterans who have low vision that impacts daily activities. Many of these Veterans are helped through VA's extensive network of Low Vision Rehabilitation programs. The problem will become more acute in VA in the coming years as more Korean- and Vietnam-era Veterans incur vision loss due to age-related diseases such as macular degeneration, diabetic retinopathy and glaucoma. Among the newest war Veterans, many who have suffered brain injuries from blasts also experience symptoms such as blurred vision, double vision, sensitivity to light, and difficulty reading. One study at a VA polytrauma center found that 38 percent of patients had a visual impairment; in those injured by blasts, the figure jumped to 52 percent.





Women's Health

Responding to the growing numbers of women Veterans, VA Research has focused additional attention on the unique or special health needs of this population. One important area of study is the effects of trauma on women Veterans, whether from military sexual harassment or exposure to war-zone threats. Other studies are examining how to remove the barriers that prevent some women Veterans from accessing VA health care, and how to expand services to better meet their needs. Many diseases common among women—such as breast cancer, osteoporosis, rheumatoid arthritis and depression—are the focus of biomedical studies and clinical trials at numerous VA sites.

Examples of VA Research Advances

Depression common, undertreated—Analyzing the charts of more than 13,000 women Veterans who were treated for diabetes or cardiovascular disease, VA researchers in East Orange, N.J., found that 27 percent also had a diagnosis of depression. About 60 percent of these patients had a milder form of the mental illness. As such, the researchers stress that providers should be careful to monitor women with chronic physical illnesses for signs of minor or major depression. In a related study, the researchers found that depression among women with heart disease or diabetes was undertreated—about a third received no treatment—and that African Americans were more likely than whites to be in this untreated group. The study did not explore the reasons for the disparity.

Plums may build bone—Dried plums may help counteract the bone loss of osteoporosis, according to research from the San Francisco VA Medical Center. Mice fed a diet supplemented with dried plums gained bone mass over six months. Almost all current treatments for osteoporosis maintain existing bone but do not build new bone. Osteoporosis and low bone mass affect about 28 million Americans, mostly women.

Helping Vietnam-era women Veterans—A \$5.6 million study is examining the long-term health of up to 10,000 women Veterans who served during the Vietnam War, whether in Vietnam, elsewhere in Asia, or stateside. Among the goals are to assess the prevalence of posttraumatic stress disorder and other mental and physical problems, and to better understand the link between PTSD and other conditions.

Facts About Women's Health

There are more than 1.4 million women Veterans in the U.S. and Puerto Rico, accounting for nearly 7 percent of the U.S. Veteran population. By 2020, 10 percent of Veterans will be women. VA has taken steps to significantly increase the participation of women Veterans in studies and to develop an expansive research agenda focused on their specific needs. Today, VA is recognized as a national leader in the investigation of women's health. At a major VA conference on women's health in July 2010, researchers discussed issues such as patient-centered care for women Veterans; the effects of trauma—both military and non-military—on women; reproductive health care in VA settings; smoking and substance abuse among women Veterans; and other mental health and chronic care issues affecting women Veterans. Outcomes from the meeting are expected to be published in the summer of 2011.







“We are proud to join forces with others who share VA’s passion for making life better for Veterans and all Americans. Partnering with research organizations and academic partners means breakthrough findings come faster and will swiftly translate into life-improving therapies for our Veterans.”

– Joel Kupersmith, MD, *Chief Research & Development Officer,*
Department of Veterans Affairs



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