

JANUARY 2012

RESEARCH ADVANCES

DISCOVERY ★ INNOVATION ★ ADVANCEMENT



AFGHANISTAN/IRAQ
ALZHEIMER'S DISEASE
ARTHRITIS
CANCER
CARDIOVASCULAR DISEASE
CAREGIVING
DEPRESSION
DIABETES
GASTROINTESTINAL HEALTH
HEALTH CARE DISPARITIES
HEARING LOSS
HEPATITIS C
HOMELESSNESS
INFECTIOUS DISEASE
KIDNEY DISEASE
MENTAL HEALTH
OBESITY
PAIN MANAGEMENT
PARKINSON'S DISEASE
PERSONALIZED MEDICINE
POSTTRAUMATIC STRESS DISORDER
PROSTHETICS/LIMB LOSS
SPINAL CORD INJURY
SUBSTANCE USE DISORDERS
SUICIDE PREVENTION
TRAUMATIC BRAIN INJURY
VISION LOSS
WOMEN'S HEALTH



Veterans Health Administration
Research & Development
Improving the lives of our Veterans

HIGHLIGHTS FROM 2011

- Launched the **Million Veteran Program (MVP)**, which will establish one of the world's largest databases of health and genetic information, for use in future research aimed at preventing and treating illness among Veterans and all Americans.
- Brought into clinical use a **bionic prosthetic ankle** developed by a researcher affiliated with VA's Center for Restorative and Regenerative Medicine.
- Developed an **artificial lung** prototype that mimics the structure of a natural lung and is described as a "significant step toward creating the first truly portable and implantable artificial lung system."
- Contributed to an international study validating a new preventive drug regimen for **tuberculosis**.
- Collaborated with the Department of Defense and National Institutes of Health on publishing "common data elements" to speed progress on research focused on **traumatic brain injury** and **posttraumatic stress disorder**.
- Published findings showing a 60 percent or greater decrease in **Methicillin-resistant Staphylococcus aureus (MRSA)** infections from a VA-wide infection-control initiative.
- Demonstrated the effectiveness of an insulin-based treatment, using a special nasal delivery system, that may help ward off **Alzheimer's** disease.
- Contributed to an international genetic study that identified potential new drug targets for **schizophrenia** and **bipolar disorder**.
- Showed that copper surfaces in hospital rooms could **kill germs** and prevent hospital-acquired infections.
- Published an article describing a VA study that is one of the first examples of "**point of care**" research, an innovative way of conducting large clinical trials.
- Made progress toward using "natural language processing" to expand the role of **electronic medical records** in improving medical care.
- Launched collaboration with the University of Maryland to explore the potential role of IBM's "**Watson**" computer system as an aid to medical decision-making.
- Published a **new guidebook** for researchers to facilitate joint studies between VA and the Department of Defense.
- Expanded funding for studying **complementary** and **alternative medicine** to treat PTSD and other conditions.
- Expanded the REACH (Resources for Enhancing Alzheimer's Caregiver Health in VA) program to support caregivers of Veterans with **Alzheimer's** disease throughout the nation.
- Identified a potential blood marker for **cognitive decline**, through a study of nearly 1,000 older volunteers.
- Published study results showing that the tiny, biocompatible brain implant that is part of the **BrainGate** neural control system remains viable and continues to effectively record brain signals for at least 2.7 years. The technology promises to help those with paralysis achieve more independence, and is also being studied as a prosthetic control system.

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.

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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. In addition to exploring new treatments for posttraumatic stress, 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.

RECENT VA RESEARCH ADVANCES

PHONE INTERVIEWS JUST AS EFFECTIVE—Telephone interviews provide the same results as face-to-face interviews when talking with Veterans about readjusting to community life after deployment. A VA team from Providence, R.I., assigned 102 OEF/OIF Veterans to receive either a telephone interview followed by an in-person interview, or vice versa. Both interviews were conducted within a one-week time frame. In each interview, the Community Reintegration of Service Members survey was given to Veterans. The survey measures how much a Veteran is involved with his or her community, as well as satisfaction levels and perceived limitations to community involvement. When the researchers analyzed the results, they found that both interview types worked equally well. Telephone interviews are likely to be more convenient and less costly.

COLLEGIATE VETERANS REPORT RISKY BEHAVIORS—OEF/OIF Veterans who attend college after deployment report more risky behaviors than non-Veterans, but also are more physically active. VA researchers from Minneapolis used data from a 2008 survey that involved 8,651 students attending Minnesota colleges. More OEF/OIF Veterans said they were currently cigarette smokers or had recently used smokeless tobacco, compared with non-Veteran students. These Veterans also were more likely to report binge drinking—having more than five drinks at a time—during the previous two weeks. Other risky behaviors were also more common, including fighting. However, OEF/OIF Veterans were less likely to use marijuana. They also reported more physical activity than non-Veterans did: A significantly higher percentage engaged in strengthening exercise regularly, and fewer spent over two hours a day playing video games or watching television.

TOBACCO USE STILL COMMON—Focus groups with National Guard OEF/OIF Veterans show that tobacco use is common for stress, anger management, and boredom relief. Tobacco was also cited as a tool for staying alert. Minneapolis VA researchers conducted the focus groups to examine the beliefs and attitudes toward tobacco in the newest generation of combat Veterans. Veterans noted that tobacco use provided a way to socialize and take breaks. Post deployment, many continued using tobacco due to nicotine dependence, stress, and the perception that cessation methods were difficult to obtain or use. The Minneapolis VA researchers note that cessation programs that address stress may help to reduce tobacco use, along with changes that allow for the acceptance of nonsmoking breaks and address the prominence of tobacco use in the military.

★ **FACTS ABOUT OEF/OIF 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 than were seen among Veterans of previous wars. Due to improved body armor and battlefield medicine, many troops are surviving complex, severe wounds and injuries that might have proved fatal in earlier generations. VA provides care for Veterans with such injuries, termed polytrauma, through a system that 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

BLOOD TEST FOR ALZHEIMER'S RISK?—Older people whose blood contains low levels of a protein-like substance called beta-amyloid 42 are at risk for cognitive decline. This research, led by a San Francisco VA team, could result in a blood test to help gauge dementia risk. The study included 997 people from Memphis and Pittsburgh. About half were African American, and about half were women. The average age at the start of the study was 74 years. Those with the lowest beta-amyloid 42 levels had the greatest cognitive decline over nine years. The association was strongest in people with low education and literacy levels. Beta-amyloid 42 is known to collect in the brains of people with Alzheimer's disease. Low levels in the blood or spinal fluid indicate high levels in the brain. An experimental spinal fluid test for beta-amyloid 42 already exists, but a blood test would be easier, less invasive, and less expensive.

DRUG SLOWS BRAIN DEGENERATION—The drug memantine appears to slow the degeneration of part of the brain in people with Alzheimer's. San Francisco VA researchers followed 47 people who took memantine for nearly a year. MRI results showed that the drug did not slow changes in total brain volume, ventricular volume, or left hippocampal volume. However, it did slow losses in right hippocampal volume. The hippocampus is involved in memory and navigation. In people with Alzheimer's disease, it is one of the first brain regions to suffer damage. In this study, people taking memantine lost 5.5 percent of right hippocampal volume, compared with a 10.8 percent loss in people not taking the drug. People taking memantine also had better scores on a test of executive functioning and a test of naming ability. Memantine, which blocks the activity of a neurotransmitter called glutamate, is approved for the treatment of moderate to severe Alzheimer's disease. It is also being tested for more than a dozen other conditions.

SLEEP DISRUPTIONS NOT TIED TO BIOLOGICAL CLOCK GENES—The breakdown in sleep patterns that often occurs in people with Alzheimer's disease appears unrelated to genes involved in circadian rhythms, say Palo Alto, Calif., VA researchers. They collected a week of data on sleep/wake patterns in 300 Veterans with Alzheimer's disease. They also did genetic studies to look for relationships between sleep/wake patterns and 122 genes that help to control the biological clock. They found no links.

★ **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. This affects thoughts, memory, and language. Symptoms range from mild forgetfulness to the inability to perform everyday tasks. Alzheimer's is estimated to affect some 5.4 million Americans; one American develops the disease every 69 seconds. By 2050, about 16 million people will be affected. Alzheimer's disease is the sixth leading cause of death in the United States, with annual direct and indirect costs of care estimated at \$183 billion.*



ARTHRITIS

VA researchers are working to understand the biological causes of osteoarthritis and rheumatoid arthritis, which together affect more than 28 million Americans. Research also includes understanding risk factors for the diseases, the most effective medical and rehabilitation strategies, and the risks and outcomes of joint replacement surgery. 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

PACING ACTIVITIES TO REDUCE PAIN—Ann Arbor VA researchers are conducting a trial that tests activity pacing in people with osteoarthritis. This is a strategy to plan rest breaks during the day, which helps to avoid arthritis flare-ups. A pilot study showed that tailored activity pacing reduced fatigue and made daily activities easier. The full-scale trial will include 156 people, randomized to receive usual care or activity pacing. One activity-pacing group will receive three tailored occupational therapy sessions; the other will receive three general OT sessions. The activity-pacing groups also will receive follow-up phone calls. After six months, the researchers will evaluate fatigue, pain, and physical activity levels in all three groups.

TNF-ALPHA INHIBITORS NOT LINKED WITH HEART PROBLEMS—St. Louis VA researchers analyzed data from nearly 21,000 Veterans with rheumatoid arthritis to see if those who used TNF-alpha inhibitors had increased risks of heart problems or death. They found no increased mortality risk in any age group. They also found no increased risk of heart problems; in fact, in patients younger than 63, those using TNF-alpha inhibitors had a 10 percent lower risk of heart problems, including heart failure, atherosclerosis, and peripheral artery disease. TNF-alpha inhibitors are commonly used in rheumatoid arthritis treatment; three are currently approved for use in the United States.

IMMUNE SYSTEM CHANGES MAY LEAD TO OSTEOARTHRITIS—Researchers led by a Palo Alto VA team have found that the complement system plays a role in the development and spread of osteoarthritis. The complement system is part of the body's immune system; it normally protects the body from harmful bacteria and viruses. This study discovered that one part of the complement system, called the membrane attack complex, is formed and activated in the joints of humans and mice affected by osteoarthritis. Researchers believe that the activation leads to low-grade inflammation and the production of enzymes that break down cartilage, resulting in osteoarthritis. This study and others like it are changing the paradigm of how osteoarthritis begins; in the past, scientists believed osteoarthritis resulted from years of wear and tear.

- ★ **FACTS ABOUT ARTHRITIS**—*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 from years of use of the joints; now they are exploring a complex web of biological factors that may contribute to cartilage breakdown. Rheumatoid arthritis affects about 1.3 million Americans. In this disease, the body's immune system attacks its own joint tissue, causing inflammation. Rheumatoid arthritis can result in the destruction of cartilage and bone. Researchers believe the damage begins early in the disease process, so early diagnosis and treatment are important.*



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. Additionally, researchers are also focusing on how to maintain good health and enhance quality of life for cancer survivors.

EXAMPLES OF VA RESEARCH ADVANCES

MAILED REMINDER BOOSTS CANCER SCREENING—A mailed reminder increases the rate of return of fecal occult blood test (FOBT) cards, which test for colorectal cancer. A study followed 769 patients, all of whom picked up FOBT cards at a clinic. Ten days later, San Diego VA researchers sent a one-page educational reminder to 387 of them. About 65 percent of this group returned their cards, compared with 48 percent of the other group. The mailing cost about \$2.50 per patient, which the authors note is more cost effective than other interventions that have been tested, including telephone calls and letters from physicians.

DUAL VACCINE SHOWS PROMISE—A vaccine against two common prostate cancer antigens seems to stop tumors from growing in a mouse model. VA researchers from Kansas City created a viral vaccine that carried a combination of genes for prostate-specific antigen (PSA) and prostate stem cell antigen (PSCA). When the vaccine was given to mice that had tumors expressing those antigens, they churned out antigen-specific T cells that attacked the tumor cells. As a result, 80 percent of the mice became tumor-free.

FIGHTING CANCER WITH NATURAL PRODUCTS—An ingredient in the Indian spice turmeric is a potent cancer fighter when teamed with chemotherapy. Detroit VA researchers found that a combination of difluorinated curcumin and two chemotherapy drugs—5-fluorouracil and oxaliplatin—inhibited the growth of colon cancer cells that were normally resistant to chemotherapy. The combination also induced cell death. About half of people with colon cancer experience chemotherapy resistance, which leads to cancer recurrence.

FISH OIL FOR PROSTATE CANCER—In a small VA study, a low-fat diet and fatty-acid supplements appeared to slow prostate cancer growth in as little as four weeks. California and North Carolina VA researchers followed 48 men scheduled to have their prostates removed due to cancer. For four to six weeks before surgery, half followed a standard Western diet; the other half ate a low-fat diet and took five grams of fish oil daily. The latter group had reduced proliferation of their cancer cells. However, the diet did not affect blood levels of IGF-1, a hormone that has been shown to promote tumor growth.

★ **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 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

TELEPHONE COUNSELING CAN CONTROL BLOOD PRESSURE—Some patients can benefit from managing their blood pressure at home. About 600 Veterans with high blood pressure were randomly assigned to receive one of three interventions, or usual care. The interventions were all telephone-based. One involved behavioral counseling from a nurse. Another involved medication counseling from a nurse or physician. The third intervention involved a combination of both types of counseling. People with the poorest blood pressure control benefited from combined counseling. Their systolic blood pressure (the higher number) decreased by an average of 8 mm Hg after 18 months.

PLAQUE LOCATION IS MORTALITY RISK—Calcified plaque in certain arteries may be a marker for increased mortality risk. A San Diego VA team completed CT scans on 4,544 patients, and then tracked them for about eight years. During that time, 163 of the patients died. The researchers found that calcium in the thoracic aorta, carotid arteries, and iliac artery was associated with an increased risk of dying from any cause. Calcium in any coronary artery was linked with more than triple the risk of mortality from cardiovascular disease.

BIOMARKERS PREDICT COMPLICATIONS—Certain biomarkers in urine and blood may help to predict who is at risk for acute kidney injury, a common complication of cardiac surgery. VA teams at multiple centers conducted the study, which involved 1,219 adults. Urine and blood samples were taken six hours after surgery. Higher urine IL-18 levels predicted nearly seven times the risk of acute kidney injury. Higher urine and blood NGAL levels predicted about five times the risk. Patients with the highest levels of these two chemicals were most likely to have longer hospital stays, longer stays in the intensive care unit, and higher risks of dying or needing dialysis. Using biomarkers to diagnose acute kidney injury may allow for earlier diagnosis, which could decrease complications and deaths.

★ **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 on both the short- and long-term needs of caregivers, as many of these individuals will provide care for years or even decades.

EXAMPLES OF VA RESEARCH ADVANCES

REACHING OUT—REACH, short for Resources for Enhancing Alzheimer’s Caregiver Health, provides support to caregivers at VA sites nationwide. The six-month program includes 12 individual in-home and telephone sessions, as well as five telephone support group sessions. A pilot of REACH, monitored by a Memphis VA team, showed that the program decreased depression, frustrations, and caregiver burden, as well as dementia-related behaviors in those being cared for. The program decreased on-duty caregiver time by about two hours per day. It is now being rolled out nationwide by VA.

CAREGIVER TRAINING BOOSTS KNOWLEDGE, CONFIDENCE—Training caregivers before older Veterans leave the hospital increases caregiver preparedness and self-efficacy, says a Durham, N.C., VA team. Forty caregivers received training in medication management, VA community-based resources, medical red flags, and home care. VA researchers were able to recruit and train caregivers before Veterans left the hospital. Two questionnaires were used to assess caregivers’ senses of preparedness and self-efficacy. Both measures improved after the training, and the improvement was sustained four weeks later. The researchers note that this type of training program may smooth the hospital-to-home transition, which can be a difficult period.

MOTHERS, WIVES ARE PRIMARY CAREGIVERS—Caregiving responsibilities for Veterans with polytrauma fall primarily on women, finds a study from four VA groups, in conjunction with university colleagues. About 80 percent of caregivers are women; of those, about two-thirds are parents and the others are spouses. About 25 percent of caregivers reported more than 40 hours a week of care. Nearly 60 percent were solely responsible for caregiving. Besides helping with daily activities, such as dressing, bathing, shopping and eating, many also provided emotional support and help with obtaining legal and health care. Most of the Veterans and Service members in the study had traumatic brain injuries.

★ **FACTS ABOUT CAREGIVING**—*Estimates vary widely on how many Americans are now caregivers 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. In February 2011, VA initiated a toll-free National Caregiver Support line to provide help and information to caregivers of Veterans. It provides resources, referrals to Caregiver Support Coordinators (located in every VA medical center), and emotional support. The line also provides information on the Caregivers and Veterans Omnibus Health Services Act of 2010.*



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

DULOXETINE FOR DEPRESSION—A serotonin and norepinephrine reuptake inhibitor (SNRI) was more effective for depression symptoms than drugs that only modulate serotonin (SSRIs), found VA researchers in Indianapolis and Philadelphia. The scientists, plus colleagues at other institutions, compared the SNRI duloxetine with four generic SSRI drugs. Duloxetine provided greater improvements in pain and functioning in 750 people with depression. In addition, the study population was more racially and ethnically diverse than is usually found in drug trials: About 19 percent was of African descent, and 15 percent was Hispanic. Duloxetine also has been used to treat anxiety, diabetes-related nerve pain, fibromyalgia, lower back pain, and osteoarthritis pain.

BELIEFS AFFECT TREATMENT CHOICES—African Americans and Caucasians have different beliefs about effective treatments for depression, says a study of more than 200 Veterans. Pittsburgh VA researchers surveyed the Veterans, all of whom had symptoms of depression. African Americans were less likely to view antidepressant medication as helpful. There were no differences in attitudes toward counseling or psychotherapy.

TELECOUNSELING, EXERCISE, EDUCATION ALL EFFECTIVE—People with type 2 diabetes and depression can benefit from telephone counseling and a walking program, say VA researchers from Flint, Mich. Patients received weekly cognitive behavioral therapy sessions via phone for 12 weeks and monthly sessions for the next nine months. The pedometer-based walking program was added partway through the 12 weekly sessions. The therapies decreased blood pressure and increased total exercise. After a year, 58 percent of the people in the study no longer showed symptoms of depression. And a VA team from Providence, R.I., followed 81 men with chronic obstructive pulmonary disease (COPD) who went to a group exercise and education program twice a week for eight weeks. After the program, the men had fewer depression symptoms and less fatigue.

★ **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 a 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

GROUP EDUCATION HELPS DIABETES CONTROL—Group educational meetings, led by a pharmacist, can improve blood-sugar control and other health measures in people with both diabetes and depression. VA researchers from Providence, R.I., enrolled 88 patients in the six-month study. Half received usual care. The other half went to a weekly two-hour meeting for four weeks, and then one 90-minute meeting per month for the next five months. The meetings included education, behavioral strategies for controlling blood sugar, and discussion of medicines that people were taking. After six months, nearly 30 percent of those attending the meetings had well-controlled blood sugar, compared with 12 percent in the group receiving usual care. The meeting group also had significantly lowered their systolic blood pressure and LDL cholesterol levels. There were no changes in symptoms of depression, and no antidepressant medications were provided.

DIABETES AND DISEASE RISK—VA researchers have found that people with diabetes are at increased risks for prostate cancer and heart attack. One team reviewed the records of 3,162 men who had prostate biopsies at the Atlanta VAMC. Those with diabetes had a 26 percent increased risk of a positive biopsy, and a 31 percent higher risk of aggressive cancer. Race and ethnicity had no impact on these risks. Other studies have suggested that diabetes reduces the risk of prostate cancer; the Atlanta researchers urge further study to discover how the two diseases may be interrelated. And a St. Louis team found that having type 2 diabetes increases heart attack risk. They analyzed medical records of more than 340,000 Veterans, ages 25 to 89. None had heart disease in 2000. Those with diabetes had about a 30 percent increased risk for a heart attack in the following years, compared with Veterans without either condition. Those with both diabetes and depression had an 82 percent increased risk.

TREATMENT THROUGH TELEMEDICINE—Monthly home videoconferencing with a diabetes educator reduced the rate of physical impairment in older Veterans. About 825 Veterans with diabetes had the videoconferencing. Another 825 received usual care. All 1,650 Veterans received pedometers. People who exercised more were shown to have fewer other health conditions, less depression, lower BMI, and better controlled diabetes. Using the pedometer was linked with reducing the Veterans' decline in physical activity.

★ **FACTS ABOUT DIABETES**—*Diabetes is a chronic disease in which the body cannot either produce or properly use insulin. Normally, insulin brings sugar out of the bloodstream and into cells. About a fifth of the Veterans receiving care from VA have diabetes, and more are at risk due to overweight or obesity. Nearly 24 million people in the U.S. have diabetes, but six 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 diabetes have type 2 diabetes, in which insulin is produced but not properly used. Complications of untreated or poorly controlled diabetes include nerve pain, eye problems, heart disease, and circulation problems. Diabetes is the seventh leading cause of death in the United States.*



GASTROINTESTINAL HEALTH

Areas of focus for VA research on gastrointestinal health include research on stomach ulcers, irritable bowel syndrome, inflammatory bowel disease, gastroesophageal reflux disease, and more. VA researchers are looking for potential drug therapies, exploring less invasive treatments, and seeking supportive strategies for Veterans during and after treatment.

EXAMPLES OF VA RESEARCH ADVANCES

STRESS REDUCTION HELPS IBS SUFFERERS—An eight-week course on mindfulness-based stress reduction helped Veterans reduce much of the mental stress associated with irritable bowel syndrome (IBS). The course is offered at the VA Puget Sound Health Care System as an adjunct to usual care for Veterans with a variety of health conditions. A formal study of the program’s impact on IBS found no short-term effect on symptoms, but definite effects on quality of life and the ability to manage stress. Prior research shows that more than 90 percent of participants who take the course are still using at least one of the techniques four years later.

LESS-INVASIVE SURGERY JUST AS GOOD FOR COLON CANCER—Veterans who have laparoscopic surgery for colon cancer recover faster with no increased risk of the cancer returning, say researchers who analyzed data from the Houston VA Medical Center. Patients who had the less invasive surgery had shorter hospital stays, shorter duration of surgery, and less blood loss. Their bowel function returned sooner after surgery compared with patients who had traditional open surgery, and they were less likely to have post-surgery complications. The study found no differences in overall survival or cancer recurrence.

WIRELESS “PILL” CONFIRMS INTESTINAL CHANGES AFTER SPINAL CORD INJURY—The SmartPill is a capsule-based technology that a patient swallows. As it moves through the digestive system, the SmartPill collects information about acidity, temperature, and pressure. It transmits the data wirelessly to a transmitter. Using the data, physicians can determine how long it takes food to pass out of the stomach, small intestine, and colon. A VA team from the Bronx, N.Y., tested the technology in people with spinal cord injury (SCI), which can result in constipation, gastroesophageal reflux disease, and other gastrointestinal complications. Food took an average of 10.6 hours to empty from the stomach in people with SCI, compared with 3.5 hours in people without SCI. Colon emptying times also were much longer in people with SCI: about 52 hours versus 14 hours.

★ **FACTS ABOUT GASTROINTESTINAL HEALTH**—*Gastrointestinal disorders affect people of all ages. More than one million Americans suffer from inflammatory bowel disease (IBD), a term that includes Crohn’s disease and ulcerative colitis. The specific causes of IBD are not known, though cigarette smoking is a known risk factor. IBD is more common in whites and in younger people—most people are diagnosed before age 30. Even more common is frequent heartburn, or gastroesophageal reflux disease (GERD). About 1 in 10 Americans experiences GERD symptoms at least once a week. Smoking and obesity may contribute to GERD symptoms, and many foods—particularly fatty, fried, citrus, and tomato-based foods, as well as chocolate and caffeine—can spur symptoms or make them worse.*



HEALTH CARE DISPARITIES

VA's portfolio of research addresses the challenges posed by the health care needs of diverse populations and the disparities that may potentially arise in healthcare delivery, access, quality, and outcomes. VA aims to understand the reasons for healthcare disparities, develop interventions to reduce them, and develop better implementation strategies to translate findings into practice. Studies address multiple ethnic and racial groups. System-level disparities also are being investigated.

EXAMPLES OF VA RESEARCH ADVANCES

TELEHEALTH CLOSES GAPS IN HAWAIIAN ISLANDERS' CARE—Psychology researchers at the Honolulu VA Medical Center used video teleconferencing to deliver group-based cognitive behavioral therapy to Veterans with PTSD who live on the Hawaiian Islands. The method proved comparable to in-person therapy in terms of safety and effectiveness, and the researchers have shared “lessons learned” about how to adapt this manual-based therapy for telehealth settings.

OBESE NOT SHUT OUT OF HEALTH MEASURES—Obese Veterans receive the same quality of care as normal-weight Veterans do, says a Philadelphia VA team. The four-year study has found no influence of weight status on the quality of care for eight measures: three measures of diabetes care (eye exam, lipid screening, and HbA1c testing) along with pneumococcal vaccination, influenza vaccination, colorectal cancer screening, mammography, and Pap smear. In fact, in some cases, overweight and obese Veterans were more likely than normal-weight ones to receive these types of care when indicated. The study's second phase, now under way, focuses on patient satisfaction and patient-provider communication.

QUALITY IMPROVING, BUT DIFFERENCES REMAIN—VA researchers from Providence, R.I., found that quality of care has increased for black and white Veterans over the past decade, but that some racial disparities persist in control of cholesterol, diabetes, and high blood pressure. The VA team looked at 10 measures using a sample of more than 1.2 million Veterans who used VA health care between 2000 and 2009. Certain health measures improved: For example, in 2005, 52 percent of black Veterans with diabetes and 61 percent of whites had controlled cholesterol levels. By 2009, those numbers had risen to 63 percent and 71 percent, respectively. But the researchers found as much as a 9 percentage point difference between black and white Veterans in measures such as having controlled blood pressure, controlled cholesterol, or controlled diabetes. The reasons for the racial disparities are not yet known; further research is needed.

★ **FACTS ABOUT HEALTH CARE DISPARITIES**—*Health care disparities exist in a range of settings in the United States. They include disparities by race or ethnicity, age, income, sex, and other characteristics. Disparities have multiple origins, including but not limited to access barriers, communication issues, cultural factors, economics, genetics, and lifestyle factors. Research suggests that reducing these disparities will require not only improving equity within the health care system, but extending beyond the system and into the communities where patients live and work. VA has traditionally been at the forefront of research in reducing disparities, and is uniquely suited for such study, given its integrated health care system that provides universal access for Veterans.*



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

TINNITUS MORE COMMON IN VETERANS—Male Veterans are more likely than non-Veterans to have tinnitus, or ringing in the ears. A Portland, Ore., VA team analyzed national data on more than 2,000 Veterans and about 5,000 non-Veterans, all aged 20 or older. Overall, 11.7 percent of Veterans reported tinnitus, compared with 5.4 percent of non-Veterans. The highest reports of tinnitus were in 60- to 69-year-old men; 17.9 percent of these Veterans and 11.7 percent of non-Veterans in this age group reported the symptom. The most common cause of tinnitus is noise-induced hearing loss, though it also can result from ear infections or aging, or as a side effect of some medications.

TBI LINKED WITH AUDITORY IMPAIRMENT—Nearly two-thirds of Veterans with traumatic brain injury may have some form of auditory impairment. A large team of VA researchers reviewed records from more than 21,000 Veterans who were evaluated for TBI between October 2007 and June 2009. About 35 percent of them reported both visual and auditory problems; another 31 percent reported auditory problems but not visual impairments. Veterans with TBI and a history of blast exposure had the highest rate of dual visual/auditory impairment.

TESTING INTERVENTIONS—NCRAR and the James Haley VAMC in Tampa are testing two interventions for Veterans with auditory processing problems. One, a frequency modulation (FM) system, uses radio waves to transmit signals directly from a microphone to an earpiece to make a speaker's voice clearer, relative to other sounds. The second, a "brain-training" computer program, leads users through tasks that involve following spoken instructions or interpreting sounds. Each of 128 Veterans in the study is randomly assigned to one of four groups. All four groups will receive educational counseling. In addition, one group will receive the FM system for eight weeks. A second group will use the computer program for the same period. A third group will use both the FM system and the computer program. The researchers hope to learn which combination of interventions is most effective.

★ **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 include allergies, infections, drugs, genetic factors, or aging. 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 one in five uses them. Noise-induced hearing loss and tinnitus are among the most common disabilities affecting Veterans. As of 2010, about 1.5 million Veterans had service-related auditory problems; most have either hearing loss or 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

SEEKING REASONS FOR LOWER TREATMENT RATES—African American Veterans are more likely than white ones to have hepatitis C, but also less likely to receive antiretroviral therapy, which can cure the disease about 55 percent of the time. A four-year study by Seattle VA researchers, initiated in 2009, seeks to discover the reasons behind the discrepancy in treatment rates. The study will involve audio recordings of provider-patient communication, as well as in-depth interviews with both patients and providers.

IT'S NOT EASY BEING GREEN—Iowa City VA researchers have shown that a product of hemoglobin breakdown may be a potential drug therapy for hepatitis C. Biliverdin appears in bruises as a green pigment. The VA team found that biliverdin blocked the effects of an enzyme that the hepatitis C virus needs to replicate itself. The team also tested bilirubin, because biliverdin rapidly converts to bilirubin in the body. Bilirubin's effects on the viral enzyme were much less potent. The team notes that biliverdin or its derivatives may be useful in creating future drug therapies for hepatitis C.

HELPING TO PREDICT TREATMENT SUCCESS—Certain tests may help physicians predict which HCV patients will respond to antiviral therapy. A Palo Alto VA team reviewed information on all Veterans with HCV treated at VA medical centers in 2007 and 2008. All started antiviral therapy during that time and were tested for rapid virological response (RVR), which indicates patients with a higher likelihood of treatment success. The study included 2,424 patients with genotype 1 HCV, 666 with genotype 2 and 419 with genotype 3. RVR rates were 15 percent, 71 percent, and 57 percent, respectively. RVR was more likely in patients with lower viral RNA levels before treatment. The researchers found several factors linked with RVR, including race, diabetic status, body mass index, LDL cholesterol levels, platelet levels, and the type of antiviral therapy. Links varied with viral genotype. The team believes that the results may help guide treatment decisions.

★ **FACTS ABOUT HEPATITIS C**—*The liver disease hepatitis C is caused by one of about 22 forms of 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 antiviral drugs can be effective, but potential side effects such as mood disorders must be managed carefully.*



HOMELESSNESS

Veterans make up a disproportionate share of the homeless in the United States. VA is taking decisive action to end Veteran homelessness. The agency's Homeless Initiative includes six pillars: community partnerships; employment programs; housing and supporting services; outreach and education; prevention; and treatment. As part of this integrated effort, VA researchers are working to increase understanding of the root causes and risk factors involved in homelessness, and to design and evaluate programs to prevent homeless, and to improve care and services for this population of Veterans. More information can be found at www.va.gov/homeless.

EXAMPLES OF VA RESEARCH ADVANCES

PTSD DISABILITY BENEFITS MAY BE PROTECTIVE—A Minnesota team surveyed 3,337 Veterans who applied for PTSD disability benefits between 1994 and 1998. Ten years later, 20 percent of Veterans who were denied benefits had experienced homelessness. Of those who received benefits, only 12 percent had been homeless. Those who received benefits also were less likely to report living in poverty.

RISKS FOR HOMELESSNESS—A VA team from West Haven, Conn., used national data to identify characteristics that increased or decreased risk for homelessness. OEF/OIF Veterans were less likely than Veterans of other eras to be homeless. But for all Veterans, the strongest predictor of homelessness was illicit drug use: Veterans who used illicit drugs were three to four times more likely to be homeless. Other strong predictors were pathological gambling, alcohol use disorders, and personality disorders.

TAILORED CARE REDUCES ER USE, IMPROVES HEALTH—Chronic diseases typically managed in primary care—such as diabetes, hypertension, heart disease—are widespread among the homeless. VA researchers have explored ways to reach homeless Veterans with primary care that is tailored to their needs, and that offers housing support, among other integrated services. At the Providence (R.I.) VA Medical Center, investigators have shown that tailored care can decrease emergency department use and medical admissions while improving disease management. The Rhode Island group followed 177 homeless Veterans over a one-year period. They received either general care at a primary-care clinic or tailored care at a special clinic. The tailored care blended primary care with an array of homeless services. Those who received tailored care had more favorable outcomes in terms of blood pressure, blood sugar, and cholesterol.

★ **FACTS ABOUT HOMELESSNESS**—*Each year, more than 130,000 Veterans spend at least one night in a homeless shelter or transitional housing. Veterans are at higher risk for homelessness than the general population. The risk of becoming homeless is particularly high in Veterans who live in poverty: about 10 percent of these Veterans are homeless in any given year. VA and the Department of Housing and Urban Development jointly administer a program that provides permanent housing and ongoing case management treatment services for homeless Veterans who require them. The National Center on Homelessness Among Veterans offers preventive services, housing support services, treatment resources, and job training. The Homeless Providers Grant and Per Diem Program provides funds to help public and nonprofit organizations establish and operate supportive housing and service centers for homeless Veterans.*



INFECTIOUS DISEASES

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. Research also focuses on infectious diseases that may put deployed troops at risk abroad, such as malaria and leishmaniasis.

EXAMPLES OF VA RESEARCH ADVANCES

HEART PROBLEMS AFTER PNEUMONIA—Older men hospitalized with pneumonia may be at risk of heart problems. A San Antonio VA team analyzed data from 50,119 Veterans with an average age of 77. Some 22 percent had a cardiovascular event within 90 days of hospital admission. Congestive heart failure and arrhythmia were the most common events: Each affected 10 percent of Veterans. Another 1.5 percent had a heart attack, and 0.2 percent had a stroke. Other studies have also suggested an increase in cardiovascular events after pneumonia, and the authors suggest further studies to determine whether interventions can reduce the frequency of these events.

DISCOVERING ANTIMALARIAL DRUGS—Malaria infects about 250 million people worldwide, including troops in Afghanistan. A Portland, Ore., VA team is seeking to develop a new class of drugs to treat the disease, which is now resistant to quinine and chloroquine. The group is also synthesizing a chemical cousin of chloroquine that would work against malaria without the problem of drug resistance. They also are designing and testing drugs called quinolones, which would destroy the malaria parasite while leaving human cells untouched.

NEW MODEL FOR DRUG SCREENING—San Antonio VA researchers have invented a model to screen compounds for activity against visceral leishmaniasis, a parasitic disease spread by the bite of a sand fly. Using the model, the team screened 4,035 compounds. They found 84 with promising activity; 69 of these are novel compounds. Visceral leishmaniasis is the most serious form of leishmaniasis, and can be fatal. Current therapies for visceral leishmaniasis are toxic and expensive, and may induce drug resistance. There have been about 3,000 cases of leishmaniasis in U.S. troops since 2003; almost all were the common and less-severe cutaneous form.

★ **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 range of other infectious diseases, 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

DIETITIAN CARE IMPROVES SURVIVAL—People with kidney problems who receive dietitian care before starting dialysis have a better chance at survival, says a Minneapolis VAMC study of 156,440 patients. All started hemodialysis between June 2005 and June 2007 and were at least 20 years old. Most—88 percent—did not receive any care from a dietitian. About 9 percent saw a dietitian for 12 months or less, and 3 percent saw one for more than 12 months before starting dialysis. Researchers found that those on predialysis dietitian care for more than 12 months had 8 percent lower mortality during the first year on dialysis, compared with those who had no dietitian care.

BLOOD MARKER MAY PREDICT COMPLICATION RISK—A blood chemical called cystatin C may help identify people at the highest risk of complications from kidney disease. Researchers from the San Francisco VAMC found that cystatin C levels were better than creatinine levels at predicting mortality, cardiovascular disease, heart failure, and kidney failure. The study included 11,909 people. Creatinine is the most widely used marker of kidney function. Cystatin C may also find usefulness as a marker of cardiovascular disease and Alzheimer's disease.

GENE FORM INCREASES RISK OF DIABETES AFTER TRANSPLANT—Men with a certain form of a diabetes-related gene are more likely to be diagnosed with diabetes after kidney transplant. Boston VA researchers and colleagues focused on 575 patients who had kidney transplants over an eight-year period. The patients had no history of diabetes before the transplant. All of them had their DNA analyzed for certain forms of two genes: ADIPOQ and ADIPOR1. Men—but not women—with two copies of a certain form of ADIPOQ were two-and-a-half times more likely to develop diabetes after transplant, compared with men without this form of the gene.

★ **FACTS ABOUT 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 use disorders, posttraumatic stress disorder, adjustment and anxiety disorders, depression, bipolar disorder, and schizophrenia. Researchers are seeking biomarkers for diagnosis and treatment, studying and testing new drug therapies, and improving access to mental health care through telehealth and other innovative approaches.

EXAMPLES OF VA RESEARCH ADVANCES

ELECTRONIC MESSAGING IMPROVES HEALTH—A home electronic messaging program reduced ER visits and hospitalizations in people with mental health issues. West Haven, Conn., VA researchers studied the effects of the program, which was established by the VA Connecticut Healthcare System in 2007. During the first two years, 76 people received a home messaging device, which connected to a telephone line. The device provided daily messages and asked for patient feedback, based on disease management protocols. A nurse practitioner received and analyzed responses. Between the six-month period before the program began and the first six months of the program, hospital admissions dropped by 80 percent and ER admissions by 60 percent. The patients in the study, who had depression, substance-use disorders, schizophrenia, or posttraumatic stress disorder, were highly satisfied with the program.

GENE, BRAIN DIFFERENCES IN SCHIZOPHRENIA—Bronx, N.Y., VA researchers, along with colleagues in the United States, England, and Greece, have discovered genetic differences in people with schizophrenia that are reflected in their brain tissue. The group compared gene and protein expression in postmortem brain samples of people with and without schizophrenia. Those with schizophrenia had certain underactive genes, which were associated with the nodes of Ranvier. These are gaps between neurons that help to conduct nerve impulses. The findings suggest that the underactive genes and resulting abnormalities in the nodes of Ranvier are associated with the symptoms and signs of schizophrenia.

MORE ATTENTION FOR PANIC DISORDER—Panic disorder is relatively common in Veterans and requires increased attention and treatment, says a Charleston, S.C., group of VA researchers. They reviewed information on 884 Veterans who visited primary-care clinics at four VA medical centers. Just over 8 percent of the Veterans met diagnostic criteria for panic disorder. Compared with other Veterans, this group reported more pain, worse general health, more mental health impairment, and more problems with social functioning. Many of the Veterans with panic disorder also met the criteria for posttraumatic stress disorder.

★ **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

HANDHELD HELP FOR WEIGHT LOSS—Can a personal digital assistant (PDA) help Veterans lose weight? VA researchers are finding out. The study is part of the MOVE! program at the Hines Hospital VA medical center. It will enroll Veterans with a body-mass index between 25 and 40 who have been dealing with chronic pain for at least six months. Half will be given a PDA on which to record food intake, physical activity, weight, mood, and pain intensity. The PDA group also will receive telephone support biweekly for six months. After a year, the researchers will analyze data to see if the PDA helps with weight loss and decreases pain intensity. MOVE! is a national weight-management program designed to help Veterans lose weight and improve their health.

PROBING BENEFITS OF OBESITY SURGERY—A VA study suggested that bariatric surgery, while it does pose certain health benefits for many obese patients, may not significantly reduce mortality, at least not in the few years following surgery. The Durham-based researchers concluded that high-risk Veterans who are considering bariatric surgery “should be counseled by their VA surgeon that bariatric surgery may not impact their survival in the medium term (six to seven years), but that the long-term association with mortality remains unknown.” The authors suggest further studies on longer-term benefits of the surgery, with an eye toward identifying the subsets of patients with obesity for whom the procedure is most beneficial.

OBESITY'S IMPACT ON CAROTID ARTERY OUTCOMES—When the carotid artery—which brings blood to the brain—becomes narrowed or clogged, boosting the risk for a stroke, doctors often recommend a procedure called an endarterectomy, in which they scrape away the plaque that has built up in the artery. A database study at the Washington, D.C., VA Medical Center and Georgetown University, found that patients with a body mass index of 35 or greater were nearly seven times more likely than non-obese patients to die within 30 days of the procedure, and more than three times more likely to experience cardiac complications. According to the researchers, “Surgeons should consider this when evaluating the risks and benefits of carotid endarterectomy in obese patients.”

★ **FACTS ABOUT OBESITY**—*Obesity has skyrocketed in the past four decades and reached epidemic proportions. More than two-thirds of American adults are considered overweight or obese, and the percentage is slightly higher among Veterans enrolled in the VA health system. 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. Obesity is determined on the basis of a person's body mass index, or BMI, which is calculated by dividing weight in pounds by height in inches squared and multiplied by 703. A BMI of 25 to 29.9 is considered overweight, while a BMI of 30 or greater is considered obese.*



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

NEW TARGETS FOR PAIN RELIEF—Durham VA researchers and colleagues at Duke University Medical Center are exploring brain chemicals that seem linked to chronic pain. The group assessed the levels of five neurosteroids in 90 Veterans who had low back pain, chest pain, muscle soreness, or headache. Neurosteroids are brain chemicals that affect the actions of many neurotransmitters. The group found that allopregnanolone levels were lower in people with more severe low back pain and chest pain. Another neurosteroid, DHEA, was found at lower levels in people with more muscle soreness. And a third chemical, DHEAS, was found at higher levels in people with chest pain. The Durham team is also involved in studies of neurosteroids and their roles in schizophrenia, posttraumatic stress disorder and traumatic brain injury. If further research clarifies the role of neurosteroids in pain symptoms, the chemicals could be targets for pain-relief therapy.

CRANIAL STIMULATION—Cranial electrotherapy stimulation (CES) may help to relieve chronic nerve pain in people with spinal cord injuries. Currently, there is no reliable treatment for such pain. A Houston VA team assigned study participants to six months of CES or six months of sham stimulation. The treatments were given for 21 days and lasted one hour each day. They involved running a small amount of electrical current through electrodes clipped to each ear. The group receiving CES felt more pain relief. Other studies have suggested that CES may relieve pain in people with spinal cord injuries or fibromyalgia.

MIND-BODY PROGRAM FOR LOW BACK PAIN—VA researchers from Pittsburgh have started a clinical trial to test a mind-body program for older adults with lower back pain. The trial will include 300 people, aged 65 and older. They will be randomized to either a meditation program or a health education program. The meditation program is modeled on the Mindfulness-Based Stress Reduction program, an eight-week program first offered in 1979. Researchers will evaluate pain relief, function, and neuropsychological performance. This is the first large, well-controlled, comprehensive examination of the effects of a mind-body program on older adults with chronic pain.

★ **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 deployments. About half of VA patients are diagnosed with at least one type of chronic pain. Some types of chronic pain, such as the nerve pain experienced by some people with spinal cord injury, are notoriously difficult to treat. The VA's Chronic Pain Rehabilitation Program, established in 1988 and based at the Tampa VA Medical Center, is a nationally known center for chronic pain research, treatment, and education (www.tampa.va.gov/chronicpain).*



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, various forms of exercise, 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

SOME GENETIC LINKS CONFIRMED, OTHERS NOT—Researchers from the VA Puget Sound Health Care System sought to replicate studies that had confirmed two known risk genes (MAPT and SNCA) for Parkinson's disease and identified three new ones that may be linked with risk (PARK16, PARK17, and PARK18). The study involved 1,445 people with Parkinson's disease and 1,161 controls. The scientists found significant associations between MAPT and SNCA and Parkinson's disease. However, they did not find that PARK16, PARK17, or PARK18 were associated with the disease. The new study involved volunteers in northern Spain, with VA researchers collaborating with scientists from six Spanish institutions, including hospitals and universities.

BRAIN IMAGING SHOWS DISEASE SIGNATURE—Functional MRI may be used to help diagnose and evaluate Parkinson's disease, says a Gainesville VA research group. They imaged the brains of 15 people with Parkinson's disease and 15 people without it. Those with Parkinson's disease had lower brain activity in certain regions, including the supplementary motor cortex, the mesial prefrontal cortex, the right middle frontal gyrus, and the left cerebellum. Parkinson's patients also had increased activity in the right cerebellum. Using the imaging, the team could predict which patients had Parkinson's disease about 92 percent of the time and predict which patients did not about 87 percent of the time. One of the control patients later developed Parkinson's disease; the MRI predicted the disease before symptoms appeared.

VITAMIN D AND PARKINSON'S—Vitamin D insufficiency is common in patients with a recent onset of Parkinson disease, say Atlanta VA researchers. However, vitamin D concentrations do not appear to decline during the progression of the disease. The team examined the prevalence of vitamin D insufficiency in untreated patients with early Parkinson's disease. At their first study visit, about 70 percent of patients had vitamin D insufficiency (a blood concentration between 20 ng/ml and 30 ng/ml), and 26 percent had vitamin D deficiency (less than 20 ng/ml). By the final visit of the study, those percentages had dropped to 52 percent and 7 percent. The authors suggest that long-term vitamin D insufficiency may play a role in the onset of Parkinson's disease.

★ **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. About 80,000 Veterans have Parkinson's disease, which is characterized by the death of dopamine-producing cells in the brain. Experts suspect that a combination of genetic and environmental factors is responsible for this loss. Large-scale VA clinical trials have played a key role in documenting the benefits of deep brain stimulation for Parkinson's patients for whom medication alone is no longer effective.*



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. 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.

EXAMPLES OF VA RESEARCH ADVANCES

“SHORT” FORM OF 5-HTT GENE LINKED WITH PTSD, DEPRESSION—People with a certain form of the serotonin transporter gene 5-HTT may be at greater risk for developing posttraumatic stress disorder, confirms a study by South Carolina VA researchers. They and others looked at rates of PTSD in 388 Veterans. All the Veterans' DNA was examined for different forms of the 5-HTT gene. Those who had two copies of the “short” form of the gene had greater PTSD severity. And a Providence VA team found that people with two “short” forms tend to dwell repetitively on their distress and its causes, which can make them vulnerable to depression. Other studies have implicated the short form of 5-HTT in depression. It makes less serotonin transporter protein than other forms of the gene do. SSRI drugs, used to treat both depression and PTSD, are thought to target 5-HTT.

GENE FOR HIGH BLOOD PRESSURE—People with certain forms of the angiotensin II receptor type-1 (AGTR1) gene may be at increased risk for high blood pressure, suggested a study by a team at the VA San Diego Health Care System. The trial included 455 people who had either normal blood pressure or prehypertension. A form of the AGTR1 gene was more common in the prehypertensive group. AGTR1 has also been implicated in heart disease, breast cancer, and diabetes.

DNA MAY HELP STEER HEART DISEASE TREATMENT—Testing for two variations in DNA on an area of chromosome 4 may help determine therapy after coronary artery bypass grafts (CABG). A Houston VA research team identified which of 1,166 patients had the variations, called rs2200733 and rs10033464. Those patients were at risk for atrial fibrillation after surgery, but only if they had been taking a beta-blocker before the surgery. People with the rs2200733 variant also seemed to have an increased risk of mortality after surgery, by about 57 percent.

★ **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,” or GWAS, 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 clinical trials. VA has treated some 200,000 Iraq and Afghanistan Veterans for PTSD since the wars began in the early 2000s.

EXAMPLES OF VA RESEARCH ADVANCES

TRACKING EFFECTS OF GROUP THERAPY—A VA team in Houston is enrolling Veterans with PTSD in a study that will use functional magnetic resonance imaging (fMRI) to track the effects of group therapy. The Veterans, from ages 18 to 65, will complete baseline interviews and fMRI scans, take part in weekly group therapy meetings for three months, and then complete final fMRI scans to detect how the activity patterns in their brain have changed. The imaging technique works by tracking oxygen flow in the brain—a measure of which brain regions are most active during specific types of tasks.

EVIDENCE ON RISPERIDONE—According to a large VA trial, the drug risperidone may not help Veterans who have PTSD that has not responded to serotonin reuptake inhibitor (SRI) drugs. The study found that six months of treatment with risperidone, an antipsychotic commonly prescribed for bipolar disorder, schizophrenia, and mania, did not improve PTSD symptoms or improve quality of life. It also produced more adverse side effects than placebo, including weight gain, fatigue, sleepiness, and excess saliva. Everyone in the study had previously tried at least two SRI drugs without adequate relief. The lead author suggested that those taking medications should talk with their doctors, and that clinicians should be cautious about prescribing the drug for PTSD.

SMOKING CESSATION SUCCESS—Integrating smoking-cessation treatment into mental health care is more effective than standard smoking cessation clinics for Veterans with PTSD, says a VA study. The trial involved 943 Veterans at 10 VA medical centers. Among those in integrated care—in which the same mental health therapist provides treatment for both PTSD and smoking cessation—almost 9 percent were able to quit for at least a year, versus 4.5 percent among those in standard smoking-cessation care. The integrated approach is now being piloted at six VA medical centers. Veterans with PTSD smoke at especially high rates—between 30 and 50 percent, about double the rate of the general public—and tend to have stronger nicotine addictions that make quitting more difficult.

★ **FACTS ABOUT POSTTRAUMATIC STRESS DISORDER**—PTSD affects many people who experienced life-threatening events, such as combat, terrorist attacks, or personal assaults. Symptoms include flashbacks, nightmares, depression, and social withdrawal, as well as physical health changes. Treatment often includes anti-anxiety drugs or other medications, along with counseling therapy. One evidence-based psychological treatment for PTSD is prolonged-exposure therapy, in which patients recall traumas in a safe setting and gradually learn to adjust their emotional response. Another is cognitive-processing therapy, a 12-session program that helps patients release the negative emotions linked to 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 Veterans with limb loss—especially those who seek to maintain an active lifestyle and require versatile, high-performance prostheses.

EXAMPLES OF VA RESEARCH ADVANCES

MINDING THE GAP (BETWEEN PROSTHESIS AND SKIN)—Researchers with the Center for Restorative and Regenerative Medicine, a joint project of VA, Brown University, and the Massachusetts Institute of Technology, modified the surface of titanium leg implants to promote skin cell growth, creating a natural skin layer and sealing the gap where the device would be implanted into the body. They also figured out how to bind FGF-2, a skin-growing protein, to the implant to encourage the sealing process. Implanting titanium prosthetic components avoids the need for a socket. But preventing bacterial invasion and infection is a key challenge, one that this research is promising to address.

VIRTUAL REALITY HELPS TEST BIONIC ARM—Virtual reality is an important factor in ongoing trials of “Luke,” the nickname for a high-tech prosthetic arm developed by DEKA Research and Development Corporation with funding from the Defense Advanced Research Projects Agency. Several VA medical centers are testing the arm, which has been fitted on more than two dozen volunteers. The arm can be controlled through various means, including shoe-mounted motion sensors that translate subtle foot movements into signals for the arm. Virtual reality—controlling an avatar on a computer screen—enables the user to practice controlling the arm in a simulated environment before being fitted with the device.

RISK FOR DIABETES-RELATED LIMB LOSS—Depression may increase the risk for major diabetes-related lower-limb amputations, according to results from a Seattle VA team. They used data from a national VA registry of nearly 532,000 Veterans with diabetes. Over four years of follow-up, there were 3,830 amputations. About one-third were major amputations (above the ankle); the other two-thirds were at or below the ankle. Depression increased risk by 33 percent for major amputations, but not minor ones. The group suggests further studies to determine whether depression screening and treatment in diabetics could reduce this risk.

★ **FACTS ABOUT PROSTHETICS/LIMB LOSS**—*The Department of Defense reported 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, complications of diabetes are another major cause of amputations: In the United States, 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 also are working to develop better treatments and adaptive technologies for Veterans with SCI. Another focus of research is addressing the medical complications that often develop as a result of this disability. These include, for example, respiratory problems, pressure ulcers, digestive complications, and circulatory problems.

EXAMPLES OF VA RESEARCH ADVANCES

BRAINGATE HAS STAYING POWER—BrainGate technology uses an array of 100 tiny microelectrodes implanted in the brain to pick up brain signals. An external computer decodes the signals and translates them into commands for electronic or robotic devices. A VA research team in Providence reported on a research participant who had the electrodes implanted 1,000 days before the study began. The team then completed five days of testing, showing that the system was still providing useful signals that allowed the participant to control a computer cursor simply by thinking about it. The team has been testing the system in people paralyzed by stroke, spinal cord injury, or ALS. Future work will seek to use BrainGate as a control system for high-tech prosthetic arms.

OTHER CONDITIONS BOOST MORTALITY RISK—Veterans with SCI plus psychosis or a substance use disorder have an increased risk of death, found a VA group from East Orange, N.J. They analyzed five years of data on more than 8,300 Veterans with spinal cord injury. Veterans with psychosis had a 47 percent increased risk of death. Those with an alcohol use or drug use disorder were 30 percent more likely to die over the five-year period. The authors suggest further studies focus on whether mental health and substance use treatment could improve survival in this group.

LUNG FUNCTION LINKED TO INFLAMMATION—In Veterans with chronic SCI, low lung function was associated with high levels of two proteins that indicate systemic inflammation. The Boston VA team studied 59 Veterans and controlled for the effects of obstructive lung disease, smoking, body mass index, and SCI severity. Levels of IL-6 and C-reactive protein were highest in Veterans with the poorest results on tests of lung function. The results suggest that lung dysfunction after SCI is related not only to the physical injury but also to body-wide inflammation. Respiratory problems are the leading cause of death in people with SCI; this research opens a new avenue to potential treatments.

★ **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 USE DISORDERS

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.

EXAMPLES OF VA RESEARCH ADVANCES

TARGETING THOSE AT RISK—A San Francisco VA team has identified certain groups of Iraq and Afghanistan Veterans who may be at the highest risk for substance use problems. The team analyzed nine years of VA health data on more than 450,000 Veterans. Risk factors for substance use disorders include having a diagnosis of depression or PTSD, being younger than 25, having greater exposure to combat, and being never married and never divorced. The study may help to improve screening and target interventions to those Veterans most in need of treatment.

TELEPHONE FOLLOW-UP COUNSELING EFFECTIVE—Eighteen months of telephone counseling leads to improved outcomes after inpatient treatment for alcohol abuse. A Philadelphia VA team followed about 250 people who had completed three weeks of inpatient treatment. They were randomized to receive short telephone contacts, longer telephone calls that included counseling, or no telephone contact. The short telephone contacts did not improve outcomes. But those who had the counseling phone calls had more alcohol-free days, and more days free of heavy drinking, than others in the study.

CHRONIC PAIN— People with substance use disorders may respond differently to chronic pain. A Portland, Ore., VA group studied 362 people with chronic pain; about 20 percent had a history of a substance use disorder. Compared with the others, these patients had poorer pain-related function and were more likely to have posttraumatic stress disorder or depression. After 12 months of usual treatment for chronic pain, the substance-use disorder group was 70 percent less likely to have improvements in pain-related function. The group did respond to a more intensive intervention that included education, clinician education, feedback, and specialty care. In 2010, an Ann Arbor VA team initiated a four-year study to test whether group cognitive behavioral therapy will help Veterans with chronic pain already in VA treatment for substance use disorders.

★ **FACTS ON SUBSTANCE USE DISORDERS**—*Substance use disorders (SUDs)—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. The population of Veterans in VA health care who have non-tobacco SUDs has been rising—from about 6 percent of VA patients in 2002, to nearly 8 percent in 2009, to 8.5 percent in 2011. 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 the late 1990s, the prevalence of smoking among Veterans in VA care was 33 percent, and in 2010 it was around 20 percent—about the same as for U.S. adults in general.*



SUICIDE PREVENTION

VA is focusing research on identifying risk factors for suicide in Veterans, as well as on screening and assessments to identify those Veterans most at risk. Other research aims to develop effective interventions and identify crucial time periods at which to intervene. In addition, VA is part of a consortium set up by the Army to mesh military and civilian efforts on suicide prevention. The consortium will allow researchers to determine how best to screen and assess personnel, develop effective interventions, and ultimately reduce suicides.

EXAMPLES OF VA RESEARCH ADVANCES

GENETIC RISK FOR SUICIDE—Two genes may increase risk for suicide attempts in adults exposed to childhood trauma. Researchers from the New Jersey VA Health Care System studied more than 800 African Americans. Those with one of the two genes were slightly more likely to attempt suicide, compared with those who had neither gene. Those with both genes were more than twice as likely to attempt suicide. The two genes help to regulate the body’s response to stress as well as many other processes, including mood, digestion, and immunity. The research could one day help clinicians identify Veterans most at risk for suicide attempts.

MIND OVER MOOD—Veterans with depression and substance abuse issues are already at high risk for suicide attempts. Among these Veterans, those who don’t feel able to extricate themselves from periods of low moods are at particularly high risk for suicide-related hospitalization. Assessing high-risk Veterans for this characteristic—called “negative mood regulation expectancy”—may help identify those who most require intervention.

CERTAIN BRAIN INJURIES ARE RISK FACTORS FOR SUICIDE—Specific types of traumatic brain injury (TBI) may put Veterans at increased risk for suicide, say researchers from the VA’s Mental Illness Research Education and Clinical Center in Denver. Using five years of data, they confirmed that TBI in general was a risk factor: compared with Veterans with no history of TBI, those with such a history were 55 percent more likely to die by suicide. Within the TBI group, those who had suffered a concussion or skull fracture were the most likely to commit suicide. The study may help pinpoint those Veterans who could most benefit from suicide prevention strategies.

TARGETING TIME PERIODS—Ann Arbor researchers focused on Veterans receiving treatment for depression to identify high-risk periods for suicide attempts. They found that the suicide rate was highest after psychiatric hospitalizations. The second-highest rate occurred during the 12 weeks after patients started new antidepressant medications. The researchers suggest that health systems could achieve maximum impact by focusing prevention efforts on these two time periods.

★ **FACTS ABOUT SUICIDE PREVENTION**—Recent data show that while suicide has continued to be more common among VA health care users than among the general population, the rates have declined in the past few years relative to the period between 1993 and 2002. In 2003, VA began focusing additional attention and resources on mental health care in response to the influx of returning Iraq and Afghanistan Veterans. The Veterans Crisis Line is a toll-free, confidential resource at **1-800-273-8255**. Veterans and their families also can chat online at www.VeteransCrisisLine.net. No registration with the VA or enrollment in VA health care is necessary.



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 and evaluating treatments, and identifying coping strategies for Veterans and their families.

EXAMPLES OF VA RESEARCH ADVANCES

ENVIRONMENT COULD HELP TO HEAL THE BRAIN—A rodent study suggests that recovering from TBI in an “enriched” environment may enhance brain function. The enriched environment included more visual stimulation, toys, and chances for interaction, compared with the normal environment. Animals in the enriched environment had improvements in spatial memory after TBI, while those housed in normal environments had no memory improvements. The animals in the enriched environment also had cellular and molecular changes in parts of their brains that indicate healing.

DEPRESSED BRAINS WITH TBI RESPOND DIFFERENTLY—Depression after TBI is common. A San Diego VA research team used functional MRI and another type of imaging to chart the brain’s ability to recognize and match facial expressions depicting happiness, anger, and fear. All of the Veterans in the study had mild TBI, and some also had depression. During the matching exercise, those with depression had more brain activity in the amygdala and other emotion-processing structures of the brain and less activity in areas of emotional control, such as the superior longitudinal fasciculus (SLF). Those with the most severe symptoms of depression had the least activity in the SLF. This was the first research to show differences in brain response in depressed Veterans with mild TBI.

UNDETECTED EYE INJURIES—Veterans with TBI may have eye injuries that go undetected in standard eye exams. A Palo Alto VA research team, collaborating with researchers at the University of Muenster, Germany, found diverse types of eye injuries in 46 combat Veterans. All had blast-related TBI. They had various kinds of damage to the iris, optic nerve, lens, retina and other parts of the eye. Yet vision was 20/20 or better in most of the injured eyes. The authors recommend comprehensive eye exams by an ophthalmologist for any Veteran with a diagnosis of blast-related TBI. VA has already instituted this practice at its rehabilitation centers.

★ **FACTS ABOUT TRAUMATIC BRAIN INJURY**—*Traumatic brain injury (TBI) is estimated to affect as many as 22 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 work in many areas of vision loss. They design new assistive devices for the visually impaired and 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 therapy techniques to address vision problems associated with traumatic brain injury and posttraumatic stress disorder.

EXAMPLES OF VA RESEARCH ADVANCES

TARGETING EDUCATION TO LITERACY LEVELS—Education that takes health literacy into account can help Veterans with glaucoma better care for themselves. A study by a VA team in Durham, N.C., enrolled 127 people. Some received usual care, while others watched a video targeted at their health literacy level: 4th grade, 7th grade, or 10th grade. People at the lowest health literacy level benefited the most: They missed fewer days of taking their glaucoma medicine, compared with a similarly health-literate group who got usual care.

NEW TECHNOLOGIES TO HELP THE BLIND—Researchers from the Baltimore VA Medical Center, the University of Maryland, and VA's Atlanta Vision Loss Center are pioneering a computer system that may one day help vision-compromised Veterans with navigation, obstacle detection, money recognition, and more. The voice-activated system, still in development, uses a clip-on webcam and responds to natural speech. When the user says “find the restroom,” for example, the computer compares the webcam's view with still images of the area around the target that have been preloaded onto the computer. Beeps and other audio signals indicate how he needs to proceed. Computer-generated speech provides additional feedback, such as distance from the target. Future applications may include helping to find lost objects and giving feedback about the facial expressions and body language of others.

ANTI-ANGIOGENICS APPEAR SAFE FOR TREATING “WET” AMD—Two common drugs for the wet form of age-related macular degeneration (AMD) do not increase the risk of mortality, according to results from an Indianapolis VA team. They compared 3,210 people who received bevacizumab or ranibizumab with 117,364 people who did not. Everyone in the study had AMD; those who received the drugs had the wet, less common form of the condition. Over 12 months, about the same percentage of people died in each group. Bevacizumab and ranibizumab are known as anti-angiogenics. They block the growth of abnormal blood vessels that contribute to wet AMD symptoms.

★ **FACTS ABOUT VISION LOSS**—*About 160,000 Veterans in the United States are legally blind, and more than one million Veterans 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. As many as 64 percent of soldiers with traumatic brain injury also have a vision problem.*



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. Areas of focus include posttraumatic stress, barriers to health care access, reproductive health, and sexual trauma. Many diseases common among women—such as cancer, osteoporosis, arthritis, and depression—are the focus of biomedical studies and clinical trials at numerous VA sites.

EXAMPLES OF VA RESEARCH ADVANCES

HOMELESSNESS AMONG WOMEN VETERANS—Women Veterans are up to four times more likely to be homeless than non-Veteran women. A series of Los Angeles focus groups identified five experiences that initiated pathways toward homelessness in these women: unemployment; childhood adversity; trauma or substance abuse during military service; post-military abuse, adversity, or relationship termination; and post-military mental health, substance abuse, or medical problems. A West Haven, Conn., VA team found that homeless women are just as likely as homeless men to have mental health problems or substance use problems.

SOY SUPPLEMENTS DON'T MEASURE UP—Concerns about hormone replacement therapy have led many women to seek natural alternatives. But a Miami VA team's research showed that taking soy tablets doesn't boost bone density or help ease menopause symptoms. Older women who had recently reached menopause took either 200 mg of soy isoflavones or a placebo pill each day. After two years, there were no differences in bone density in the women's spines, hips, or femurs. More women taking soy said they had hot flashes and constipation, compared with those taking placebos.

BRAIN INJURIES DIFFERENT IN WOMEN—Women Veterans with deployment-related traumatic brain injury (TBI) are less likely than men to have posttraumatic stress disorder (PTSD). However, they are more likely to have depression or another type of anxiety disorder. Women also reported more severe TBI symptoms than men did. The VA's National Center for Posttraumatic Stress Disorder looked at diagnoses and symptoms in 12,605 Veterans of Iraq and Afghanistan who were evaluated as having deployment-related TBI. They note that other conditions besides PTSD may be linked with TBI, particularly in women, and care providers should identify and treat these conditions appropriately.

★ **FACTS ABOUT WOMEN'S HEALTH**—*There are more than 1.8 million women Veterans in the U.S. and Puerto Rico, accounting for 7.5 percent of the U.S. Veteran population. If current trends continue, by 2030, 14 percent of Veterans will be women. More than 200,000 women were deployed to Iraq and Afghanistan, making this the largest wartime deployment of women in the history of the United States. Women Veterans are younger than their male counterparts. About half are married, and about half of those who are married are in dual-military marriages. About 11 percent of women Veterans are single mothers. 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.*



Administration
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