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STATE OF VA RESEARCH 2012

Improving Veterans' Lives

SECOND PRINTING

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STATE OF **VA RESEARCH 2012**

Improving Veterans' Lives

A MESSAGE FROM VA'S CHIEF RESEARCH AND DEVELOPMENT OFFICER

Joel Kupersmith, M.D.
Chief Research and Development Officer
Department of Veterans Affairs

The Office of Research and Development of the Department of Veterans Affairs (VA) plays a key role in advancing the health and care of America's Veterans. As part of the largest integrated health care system in the United States, VA Research draws upon engaged patients and families, committed clinician scientists, and an unparalleled national health care delivery infrastructure to help deliver high quality health care and to develop cutting edge medical treatments for Veterans, their families, and our Nation.

In 2011, as in previous years, VA researchers addressed the needs of the entire Veteran population, from the young recruit who returns from combat with injuries to the aging Veteran with chronic diseases. We made progress in improving the functional recovery and quality of life of Veterans with traumatic brain injuries; tested prosthetic devices that could potentially be controlled by the patient's own brain; and uncovered important information that will help prevent Veterans from becoming homeless or attempting to take their own lives.

Our researchers found important new clues that will help prevent and treat Alzheimer's disease; assist victims of sexual trauma and posttraumatic stress in recovering from the lingering aspects of their experiences; and advance the understanding, prevention, and treatment of chronic illnesses including cancer, cardiovascular disease, and diabetes as well as infectious diseases such as tuberculosis and AIDS.

We took a giant step towards the future of medicine in 2011, when we launched the Million Veteran Program, a partnership with Veterans that aims to build one of the world's largest databases of genetic, military exposure, lifestyle, and health information, with the goal of providing medical care that is personalized to the genetic makeup of individual Veterans.

Last year, we lost one of the giants of VA Research when Dr. Rosalyn S. Yalow, co winner of the 1977 Nobel Prize in Physiology or Medicine, passed away. However, in 2012 one of her co winners, Dr. Andrew V. Schally, will proudly celebrate the 25th anniversary of his award and the 50th anniversary of his association with VA in his laboratory at the Miami VA Medical Center, where he continues to make discoveries that benefit Veterans and all Americans.

VA research is a 21st century model for how American medicine can be transformed through scientific inquiry and innovative thought, leading to evidence based treatments that improve patients' care and most importantly their health outcomes. As we begin our 87th year of service to Veterans, the state of VA Research has never been stronger. I invite you to read this engaging publication to learn more about the many ways in which our researchers are improving Veterans' lives.

Joel Kupersmith, MD

Cod liver oil capsules
PHOTO: GETTY IMAGES

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ACCESS AND DISPARITIES

VA has a long-standing portfolio of research addressing the challenges posed by minority health care needs and the disparities that arise in health care delivery, access, and quality. These varied research studies address disparities in care among multiple ethnic and racial groups, most prominently between African Americans and whites, but also among various groups, including Hispanics and American Indians.

Minority health care needs are an important priority for VA researchers.
PHOTO: BANANASTOCK

Current research projects are addressing disparities related to joint replacement, end-of-life care, mood disorders, diabetes, health literacy, and many other topics. In general, research on health disparities focuses on understanding the reasons for these disparities in care; developing interventions to reduce them; and developing better implementation strategies to translate research findings in this area into practice.

A team from the VA Boston Healthcare System and Harvard Medical School recently conducted a study to better understand which VA hospitals provide care for substantial numbers of African American Veterans and whether the location of care impacted disparities.The team assessed differences in mortality rates between African American and white Veterans across 150 VA hospitals for six conditions.

The researchers found that just nine of 150 VA hospitals cared for nearly 30 percent of African American Veterans, and 42 hospitals cared for more than 75 percent of black Veterans. Their findings showed that while overall mortality (death) rates were comparable

between minority-serving and non-minority-serving hospitals, mortality rates were higher in minority-serving hospitals for two conditions: heart attacks and pneumonia. The researchers are now studying the underlying reasons for those disparities.

Type 2 diabetes is more prevalent and severe among African Americans than among whites. A team from the Center for Health Equity Research and Promotion at the Philadelphia VA Medical Center tested peer mentoring along with another strategy—financial incentives—to help minority Veterans manage their diabetes.

The pilot study included 118 Veterans, all of whom were struggling to control their diabetes. One group received usual care; a second received counseling from trained peer mentors; and a third became eligible for payments of up to $200 if they succeeded in significantly lowering their hemoglobin A1C levels—a measure of blood sugar—over six months. The peer mentors, diabetics themselves, earned a modest reward—$20 per month—if they contacted the person they were counseling at least four times a month during the study. The peer mentoring program showed significant favorable results; financial incentives failed to show the same benefit. The findings were presented in 2011 and published in early 2012.

Dr. Mary Neill sees an American Indian Veteran of World War II at a VA clinic in southern Oregon.

FOR PUERTO RICAN VETERANS, CLUES ON THE GENETIC ORIGINS OF SCHIZOPHRENIA

It's a long way from the green hills and palm-lined beaches of Puerto Rico's northern coast to the Bronx VA Medical Center in New York City. But the distance is no barrier to scientists seeking to solve the genetic puzzle of schizophrenia, a potentially devastating mental illness that affects some 100,000 VA patients and more than two million Americans.

Bronx VA Medical Center researchers study the genetics of schizophrenia.
PHOTO: LYNNE KANTOR

A team at the Bronx hospital, with help from VA's San Juan Medical Center, is studying genetic risk factors for schizophrenia among countryside-dwelling Puerto Ricans and their New York-based relatives.

The study's initial purpose was to look at families in the New York City area with multiple members with schizophrenia. One of the families they chose was a large nuclear family with many members still living in two Puerto Rican towns. By comparing family members with schizophrenia to those free of the disease, the researchers zeroed in on target genes that boost the risk of the disease.

The group recently published a paper that honed in on a gene known as AMACR. Mutations in the gene may play a key role in schizophrenia risk, especially in men. The team was also part of a worldwide study involving 250 scientists in more than 20 countries. Results of that study, published in *Nature Genetics* in 2011, indicated that there were "regions of interest" that could eventually link specific genes to schizophrenia and bipolar disorder.

"Schizophrenia is a disease that can look different clinically, biologically, and genetically," said Jeremy Silverman, PhD, the team's lead researcher. "So it makes sense that there are different genes that are going to contribute to risk in different populations."

Although scientists need to learn far more about the genetic underpinnings of schizophrenia before there's a firm basis to develop new drug treatments, Silverman hopes his research will make an important contribution with regard to schizophrenia among those of Puerto Rican descent, and possibly other groups.

AFGHANISTAN AND IRAQ VETERANS

VA's Office of Research and Development has implemented a comprehensive research agenda to address the deployment-related health issues of the newest generation of Veterans—those who have returned from Iraq and those returning from Afghanistan. Issues of high importance for these Veterans include posttraumatic stress disorder (PTSD), traumatic brain injury (TBI), other mood and anxiety disorders, military sexual trauma, and substance use.

One highlight of VA's ongoing effort to address these issues is a study titled "Neuropsychological and Mental Health Outcomes of Operation Iraqi Freedom: A Longitudinal Cohort Study." It involves several hundred Army soldiers who had taken part in an earlier joint VA-DoD study. Researchers hope to learn about any enduring effects war may have on mood and symptoms of stress, thinking and reaction skills, and daily functioning.

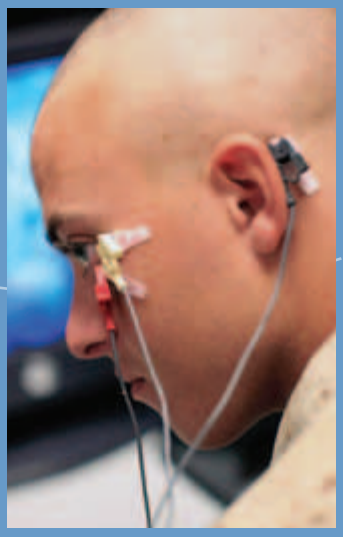
Another key project is the Marine Resiliency Study, which is based in San Diego and involves more than 2,000 Marines. VA and Department of Defense researchers are probing dozens of risk factors, from biological to behavioral, that may affect the abilities of Service members and Veterans to withstand mental and emotional stress.

Both projects, among several other large cohort studies, are developing valuable mental and physical health information on Service members prior to deployment and then conducting assessments after the deployment ends. This information will help researchers pinpoint the health impacts of combat duty.

In 2011, researchers from VA's Palo Alto Health Care System and Stanford University published findings showing that Iraq and Afghanistan Veterans with a PTSD diagnosis experience more physical ailments than Veterans with no mental health conditions. The researchers analyzed data from all 90,558 Iraq and Afghanistan Veterans who used VA outpatient care in fiscal years 2006 and 2007.

In particular, women Veterans with PTSD were found to be more susceptible than their male counterparts to physical health issues. Women with PTSD had an average of 7 other medical conditions; women without PTSD had an average of 4.5 conditions. Men with PTSD averaged 5 other medical conditions, while those without PTSD had 4. The most common conditions in both sexes included lower spine disorders and joint problems in the lower extremities. In addition, men had more hearing problems, while women had more headaches. The study's findings indicate that early intervention for both physical and mental illness is critical in helping Veterans avoid long-term health problems.

Racial and ethnic differences have been found in the use of mental health services in the general public, but at least one 2011 study found the case may be otherwise in VA. A team at VA's Center of Excellence for Research on Returning War Veterans in Waco, Texas, studied 148 Iraq and Afghanistan Veterans to determine whether religious coping—that is, using resources such as prayer and pastoral care to cope with mental and emotional stress affected the use of VA mental health services. The study found there were no differences among African-American, Hispanic, and non-Hispanic white Veterans in the use of either secular mental health services or religious counseling. The study's authors concluded that "the failure to find race [or] ethnicity differences in the use of mental health services in a sample of relatively young Veterans is a positive sign, and suggests that individuals who might otherwise have limited access to mental health services in the community are taking advantage of those services in VA."



A Marine takes part in a VA-DoD study on factors that affect emotional resilience and the risk of PTSD.
PHOTO JAE C HONG/ASSOCIATED PRESS

Soldiers from the 82nd Airborne Division take part in a training exercise.
PHOTO: TSGT. SEAN W. WORRELL

VA-DOD COLLABORATION RUNNING HIGH

In recent years, collaboration has significantly increased between VA and Department of Defense researchers, especially in the areas of traumatic brain injury, PTSD, and other psychological health topics affecting returning Service members and Veterans. DoD and VA researchers are charged with finding specific solutions that enable appropriate protection and treatment options for their respective populations.

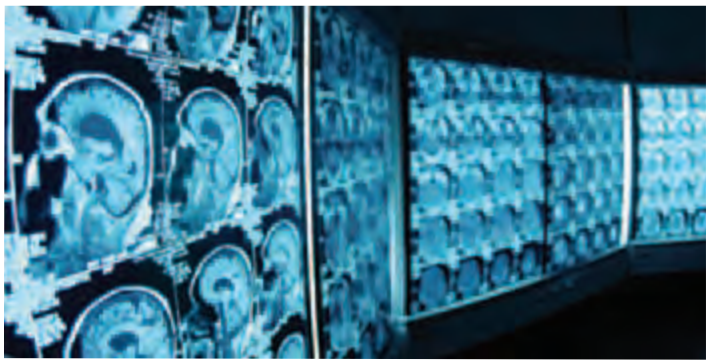
The agencies "divide and conquer" within research topics, while also recognizing the value collaboration offers. For a topic such as TBI, VA investigators will typically take the lead in exploring long-term complications that might affect Veterans, while DoD researchers will focus on acute detection and immediate treatment to prevent further damage.

In 2011, the VA-DoD partnership took a major step forward with the publication of "common data elements." These elements allow researchers from both agencies to "talk the same language" while studying brain and psychological disorders. They can similarly define injuries and use equivalent measures to diagnose conditions and gauge the effectiveness of new therapies—an improvement that promises to speed progress toward new knowledge and improved treatment.

Also in 2011, VA's Office of Research and Development held a psychological health and TBI research program review with the Defense Health Program. The two agencies shared current research and development efforts, discussing areas where they may leverage investments to eventually maximize clinical practice and health services.

Research topics discussed at the meeting included PTSD, suicide, family challenges, resilience factors, substance misuse, depression, and military violence. The agencies also identified future areas of collaboration, including projects relating to the seamless integration of electronic medical records.

Timothy O'Leary, MD, PhD, VA's deputy chief research and development officer, commented: "Collaboration and joint planning will maximize the impact of our medical research investments. This approach will allow us to more effectively translate the results of our studies into better care for service members and Veterans."



VA and the Defense Health Program are sharing research and development efforts related to brain injury and psychological health.
PHOTO: HEMERA TECHNOLOGIES

PHOTO: HEMERA/THINKSTOCK

AGENT ORANGE

Agent Orange is a blend of tactical herbicides the U.S. military sprayed from 1962 to 1971 during Operation Ranch Hand in the Vietnam War to remove trees and dense tropical foliage that provided enemy cover. More than 19 million gallons of various "rainbow" herbicide combinations were sprayed, but Agent Orange was the combination the U.S. military used most often. The name "Agent Orange" came from the orange identifying stripe used on the 55-gallon drums in which it was stored.

Today, several decades after these herbicides were sprayed, concerns about health effects from these chemicals continue. VA Research supports a broad portfolio of research on diseases related to Agent Orange. VA investigators seek to understand the causes and best treatments for conditions affecting Veterans related to possible exposure to herbicides. They are also studying the optimal methods for ensuring this knowledge is incorporated into the health care Veterans receive.

VA contracts with the Institute of Medicine (IOM) of the National Academy of Sciences, a non-governmental organization, to scientifically review evidence on the long-term health effects of Agent Orange and other herbicides on Vietnam Veterans. On Sept. 29, 2011, IOM released "Veterans And Agent Orange: Update 2010," the seventh, and most recent, of IOM's series of biennial reviews of the long-term health effects of herbicides on Vietnam Veterans.

In its 2010 update, IOM recommended that VA search its own records to look for possible associations between Vietnam service and specific health outcomes, specifically those that are relatively uncommon. IOM also noted that there is some evidence that neuropathy (damage to nerves of the peripheral nervous system) of acute (rapid) or subacute (slightly less rapid) onset may be associated with herbicide exposure.

In 2011, IOM also published a study, done at VA's request, on the effects of Agent Orange on those who served on naval vessels in deep water, off the coast of Vietnam, during the Vietnam War. At present, VA compensates only naval Veterans who served on the ground or in inland waterways in Vietnam. Although the IOM found several plausible ways by which Blue Water Navy Veterans could have been exposed to herbicides, there was not enough information for the IOM to determine whether Blue Water Navy personnel were or were not exposed to Agent Orange.

VA itself maintains a major focus on the causes of and treatments for medical conditions currently compensable for Agent Orange exposures. Ongoing studies include work on prostate cancer, lymphoma, leukemia, myeloma, lung cancer, head and neck cancer, Parkinson's disease, cardiovascular disease, metabolic syndrome, and diabetes.

Full information relating to Agent Orange and other military-related environmental health hazards can be found on the Web site of VA's Office of Public Health: www.publichealth.va.gov.

PROBING WAR'S EFFECTS ON WOMEN SERVICE MEMBERS

A VA and Department of Defense study published in 2011 affirmed that women are being exposed to combat at a significantly higher rate than ever before and finds that the mental health needs of women who have experienced combat are not significantly different from those of men. Read more in VA Research Currents at

www.research.va.gov/currents/feb12/feb12-02.cfm.

FOCUS ON VIETNAM-ERA WOMEN VETERANS

Joan Furey, who received a Bronze Star for meritorious service after her tour as a nurse in Vietnam, receives a certificate from then-Maj. Gen. Donn Pepke naming her an honorary member of the Fourth Infantry Division.

Little is known about the long-term health and mental health status of women Vietnam-era Veterans. For many of these women, the effects of the war are still present in their daily lives. As these women grow older, it is important to understand the impact of wartime deployment on physical and mental health outcomes many years later.

The Long Term Health Outcomes of Women Vietnam Veterans study is the most comprehensive study to date of women Vietnam-era Veterans. The study is designed to evaluate the long-term mental and physical health effects of military service during the Vietnam era in women. It will assess the prevalence of PTSD, other mental and physical health conditions, and disability for women Vietnam Veterans, and explore the relationship between PTSD and other conditions and the Vietnam deployment experience.

The five-year study is being coordinated by VA's Cooperative Studies Program and involves researchers from across the country. The principal proponents are Kathryn Magruder, MPH, PhD, of the Charleston VA Medical Center; Amy Kilbourne, PhD, of the VA Health Services Research and Development Office in Ann Arbor, Mich.; and Han Kang, DrPH, director of the Environmental Epidemiology Service in VA Central Office in Washington, DC.

Participants will include some 10,000 women Veterans who served in the U.S. military, including those who served in Vietnam, those who served near Vietnam in Southeast Asia, and those who remained stateside. Information will be gathered by a mail survey, telephone interviews, and reviews of medical records for a selected sample of women.

The study, with a projected cost of $5.6 million, will be used to shape future research on women Veterans and to plan for appropriate services for women Veterans and the aging Veteran population. It will also provide information about Vietnam women Veterans' current health needs.

AGING/OLDER VETERANS

Americans are living longer than ever before because of better health care. By 2030, there will be more than 70 million Americans aged 60 and older—one in every five citizens.

In the 1970s, VA began planning to meet the challenges the aging World War II population would present. To handle this complex issue, the Department developed Geriatric Research Education and Clinical Centers (GRECCs). GRECCs attract scientists and health science students to the field of geriatrics in order to increase the basic knowledge of aging and the diseases commonly associated with it. They also study how care is delivered to elders and the effects of rehabilitation.

Today, there are 20 GRECCs at VA facilities throughout the nation, publishing scores of high-quality peer-reviewed articles on aging each year, and providing thousands of hours in geriatric education to medical and health care students and post-doctoral fellows.

Research under the auspices of GRECCs is part of a larger portfolio overseen by the Office of Research and Development addressing older Veterans and their health needs. VA studies

World War II Veteran Ivan E. Hutchins

address not only diseases and health conditions common among aging Veterans, but also the aging process itself: What biological processes occur as the tissues and organs of the human body change in later life, and what preventive steps can be taken to preserve health, vitality, and function to the fullest extent possible?

Among the highlights of GRECC-affiliated research during 2011 was a study at the VA Palo Alto Health Care System that found that the complement system, a group of proteins that move freely through the bloodstream, plays an important role in the development and spread of osteoarthritis, or degenerative arthritis. The researchers discovered that one component of the system, called the membrane attack complex (MAC), is formed and activated in the joints of both humans and mice affected by osteoarthritis. The findings suggest that the disease is not caused, as previously thought, simply through wear and tear on the joints. Armed with these new insights, researchers may be able to identify new ways to prevent and effectively treat the disease.

Geriatrician Lenise Cummings-Vaughn, MD (second from left) meets with prospective participants in a memory study at the St. Louis VA GRECC.
PHOTO: JERRY NAUNHEIM

In other research, a team at VA's Durham-based Center for Health Services Research in Primary Care examined how well older patients understood the discharge instructions from an academic medical center emergency department where they had received care. The study found that a substantial number of patients, or their family members or other proxies, did not adequately understand the discharge information. The researchers recommended "strategies to improve communication of emergency department discharge information to older patients and their families."

By 2030 one in every five American citizens will be aged 70 or older.

At the Atlanta VA Medical Center, researchers developed a "face discrimination" test that they say can help to quantify the impact of vision loss, especially among older adults with age-related macular degeneration, and to track the benefits of low-vision therapy. The test involves sets of color photos showing male and female faces. A person being evaluated is shown a "test" face surrounded by eight reference images. One of the reference faces is the same as the test face, although it could be shown from a different angle and with a different expression. The test-taker has to pick the reference image that matches the test image, and determine the expression of the test image—normal, smile, or frown.

The researchers tried the test with older people with age-related macular degeneration in both eyes, and with younger and older healthy controls. Not surprisingly, performance was best among the young volunteers. They responded quickly and made almost no mistakes. The older controls—those without macular degeneration—had somewhat slower response times, and made some errors, mainly in identifying the expressions. Those with macular degeneration were slower and made more errors in identification than did the older controls.

NASAL INSULIN TREATMENT SHOWS PROMISE AGAINST ALZHEIMER'S

A recent pilot study by VA researchers found that a nasal insulin treatment improved memory, thinking skills, and functional ability in people with Alzheimer's disease or its precursor, mild cognitive impairment. The study, which was led by VA's Puget Sound GRECC, appeared in 2011 in the *Archives of Neurology*. It built on previous studies that linked low brain levels of insulin to Alzheimer's.

Insulin helps turn sugar in the bloodstream into energy for cells. In type 1 diabetes, the pancreas doesn't make enough insulin—and in type 2 diabetes, which affects nearly one in every five VA patients, the body is resistant to the hormone's effects. Insulin also plays a key role in brain aging in general, and in several chronic diseases.

The VA team gave 104 adults 20 international units (IU) of insulin, 40 IU of insulin, or a saline placebo for four months. It was given through a nebulizer-like device that fits around the nostrils and generates droplets that spread into the upper sinuses—so that the insulin reaches the brain within minutes, and does not increase insulin levels throughout the whole body, which could have harmful effects.

Treatment with 20 IU of insulin improved memory—specifically, the ability to recall a story after a delay. Both doses of insulin preserved general thinking skills and functional ability. Patients who received a memory boost from the insulin saw an average of 20 percent improvement, a clinically significant finding.

According to team leader Suzanne Craft, PhD, the next steps in the process include comparing the effects of long-acting insulin with those of regular insulin for a four-month period, and looking at the effects through brain imaging. Another study will look at different doses. The team also hopes to conduct a larger, multisite study in the near future.

"I think a therapy related to insulin and insulin function will be the most effective therapy for patients with Alzheimer's or certain other forms of dementia who have insulin resistance as the underlying pathology," said Craft. "There are still a lot of questions to answer, but we're very hopeful."

Dr. Bill Banks demonstrates a nasal applicator used to deliver insulin quickly and directly to the brain. Looking on is lead researcher Dr. Suzanne Craft.
PHOTO: JIM BRYANT

THE DIABETES ALZHEIMER'S LINK

A 2011 pilot study by VA researchers found that a nasal insulin treatment improved brain function in people with Alzheimer's disease or its precursor, mild cognitive impairment. For an interview with lead researcher Suzanne Craft, PhD, on the intriguing link among diabetes, insulin, and Alzheimer's disease, visit VA Research Currents at

www.research.va.gov/currents/oct-nov11/oct-nov11-01.cfm.

PHOTO: ISTOCKPHOTO/THINKSTOCK

CAREGIVERS

The high-quality care VA provides doesn't stop with the Veteran. It extends to the family member or loved one tending to the everyday needs of a disabled, chronically ill, or aging Veteran.

In 2011, VA began implementing the provisions of the Caregivers and Veterans Omnibus Health Services Act of 2010. This Act provided benefits for caregivers of seriously wounded Iraq and Afghanistan Veterans that include a stipend, mental health services, and health care coverage if the caregiver is not otherwise entitled to care or services under a health-care contract.

Navy Veteran Raymond Boop lives in Charleston, SC.
PHOTO: STACY PEARSALL

In 2011, VA also established its toll-free National Caregiver Support Line. Callers to the support line are spouses, children, other family members, and friends of Veterans, as well as Veterans themselves. Trained responders listen to the callers and assess how best to offer support, appropriate direction, and connection to needed resources. The phone number for the support line is 1-855-260-3274.

Before the Act took effect, VA was already offering a range of benefits and services that support Veterans and their family caregivers. These include such programs as in-home care; specialized education and training; respite care; equipment, home, and automobile modification; and financial assistance for eligible Veterans. Every VA medical center has a Caregiver Support Coordinator to help link caregivers and Veterans with available VA and non-VA support resources.

Research has played a key role in helping to expand and improve these services. A 2011 study in the *Journal of Head Trauma Rehabilitation* looked at caregivers for injured Veterans of the wars in Iraq and Afghanistan in depth, describing the work they are required to do and the care they provide. The survey included 564 caregivers of Service members and Veterans who had had traumatic brain injuries and received in-patient rehabilitation care at one of VA's Polytrauma Rehabilitation Centers between 2001 and 2009.

Nearly 80 percent of caregivers were women, typically the Veteran's parent or spouse. The researchers, from the Minneapolis VA Medical Center, learned that even as long as four years after the injury, 22 percent of the patients still required assistance with basic activities of daily living such as bathing, feeding, and toileting. An additional 48 percent needed help with higher-level tasks such as shopping, driving, and money management.

Nearly one-quarter of the caregivers who responded to the survey reported that they were providing more than 40 hours of care every week—the equivalent of a full-time job—and another 20 percent said that they provided 5 to 40 hours of care. Of the Veterans who needed help with basic activities, half of their caregivers provided care for more than 80 hours a week. Nearly 60 percent of caregivers were solely responsible for the caregiving the Veteran received. Most provided other kinds of help to Veterans, including managing emotions and navigating health and legal systems.

Nearly one quarter of Veteran caregivers provide the equivalent of a full-time job in care every week. PHOTO:ISTOCK IMAGES

HELPING ALZHEIMER'S CAREGIVERS

Caregivers who care for Veterans with Alzheimer's disease and dementia typically report feeling lonely, overwhelmed, frustrated, and at risk for their own health problems.

To address these issues, VA created a pilot program called REACH VA (Resources for Enhancing Alzheimer's Caregiver Health in VA). REACH VA is the first national clinical implementation of a proven behavioral intervention for stressed and burdened dementia caregivers.

Between September 2007 and August 2009, 24 VA medical centers provided 127 caregivers connected with 24 medical centers 12 individual in-home and telephone counseling sessions; five telephone support group sessions; education on safety and patient behavior management; and training for their individual health and well being.

The REACH VA program provides support for caregivers of Veterans with Alzheimer's disease and dementia. PHOTO: JUNIPER IMAGES

A study of the program by VA researchers from the Memphis VA Medical Center was published in 2011 in the *Archives of Internal Medicine*. The study documented the responses of caregivers to the program. Most reported a reduction in depressive symptoms and a feeling that some of their burden was lifted. They reported less frustration and said they were able to spend fewer hours per day on their caregiving duties. Caregivers even reported there were decreases in dementia-related behaviors on the part of the Veterans they cared for.

As a result of the study's findings, VA is rolling out REACH VA on a national basis through home-based primary care programs across the Nation. In addition, the program will be modified to assist caregivers of Veterans with diagnoses other than Alzheimer's and dementia, such as spinal cord injury and traumatic injury.

"The REACH VA model exemplifies the many different kinds of support VA offers to the caregivers of Veterans," said Secretary of Veterans Affairs Eric K. Shinseki. "This program has been proven to provide the right resources, training, and a renewed focus on personal health that can make a world of difference to those caregivers and their Veterans."

CHRONIC DISEASES

Promoting good health and managing chronic conditions remain high priorities for VA health care and VA research. The following pages offer a brief overview of some of the chronic conditions that rank high among VA's health research priorities, with examples of progress in 2011.

CARDIOVASCULAR DISEASE

Cardiovascular disease, an umbrella term for the diseases and conditions that affect the heart and blood vessels, is the number one killer of Americans and the leading cause of hospitalization in the VA health care system. Smoking, high blood pressure, high cholesterol, obesity, lack of physical activity, and uncontrolled diabetes are all modifiable risk factors for heart disease. In 2011, researchers at the San Diego VA Medical Center published the results of a study that tracked more than 4,500 patients for about eight years, following an initial CT scan. During that time, 163 of the patients died. The researchers determined that calcium in the thoracic aorta, carotid artery, and iliac artery was associated with an increased risk of dying—and that calcium found in any coronary artery tripled the risk of death from cardiovascular disease.

CANCER

VA's research program supports improved methods of diagnosing and treating cancer that have directly improved Veterans' lives and the lives of other Americans. Recently, researchers at the West Los Angeles VA Medical Center and the David Geffen School of Medicine at UCLA found that a low-fat diet supplemented by fish oil can slow the growth of prostate cancer cells. The low-fat diet consisted of 15 percent of calories from fat, and the men on the diet took five grams of fish oil per day in five capsules, three with breakfast and two with dinner, to provide omega-3 fatty acids. Also in 2011, a team made up of members from VA, Harvard Medical School, Mount Sinai Medical Center, and the Dana Farber Cancer Institute compared the quality of cancer care for older men who were diagnosed at a VA or a Medicare fee-for-service facility between 2001 and 2004 and followed through 2005. The two health systems came up about equal on nine measures of care; however, VA patients with colorectal cancer were diagnosed at earlier stages and had higher rates of curative surgery. They also had higher rates of chemotherapy for certain types of lymphoma, and were more likely to receive drugs known as bisphosphonates for myeloma. The only measure on which Medicare exceeded VA was the use of an advanced type of radiation to treat prostate cancer.

Veteran Gladys Colon (right) is seen at a VA clinic geared to Veterans coping with homelessness. PHOTO: FRANK CURRAN

Dr. Roy Soetikno's team at the Palo Alto VA has collaborated with Japanese gastroenterologists to develop expertise in detecting flat or depressed lesions in the colon.

DIABETES

Diabetes affects about one million Veterans within the VA health care system—nearly 20 percent of VA's patient population. The disease is also the leading cause of blindness, end-stage renal disease, and amputation for VA patients. VA recently completed a major multisite study known as the VA Diabetes Trial. Researchers looked at nearly 1,800 patients who had had difficulty controlling the levels of glucose (sugar) in their blood and did not respond to the usual treatments for the illness. While the main results from the study had been published earlier, a paper in the November 2011 *Journal of Diabetes and its Complications* showed that patients who intensively controlled their glucose levels reduced their rates of cardiovascular events compared to those on less aggressive treatment—but only if they began intensively controlling their glucose levels within 15 years of developing the illness. Those who began intensive control 15 to 22 years after becoming diabetic saw no benefit; and those who began the routine more than 22 years after the onset of diabetes may have been harming themselves, actually increasing their cardiovascular risk. According to the study's lead author, William Duckworth, MD, of the Phoenix VA Medical Center, the single most beneficial thing diabetic patients can do to avoid complications is to raise their high-density lipoprotein (HDL) cholesterol levels.

DIGESTIVE DISEASES

Gastrointestinal disorders affect Veterans of all ages and backgrounds. VA researchers are looking at stomach ulcers, irritable bowel syndrome, inflammatory bowel disease, colorectal cancer, gastroesophageal reflux disease, and other conditions. VA has made it a priority to screen its patients aged 50 years or older for colorectal cancer. A 2011 study showed that the Department is meeting its goals in the area, and analyzed why some Veterans are not participating in a common screening test for the disease. The study team, led by VA's National Center for Health Promotion and Disease Prevention, analyzed the records of more than 36,000 Veterans and found that more than 80 percent of them had either had an annual fecal occult blood test; a flexible sigmoidoscopy examination every five years; or a colonoscopy examination every ten years. More than 70 percent of the Veterans who had been screened had had a colonoscopy. Groups of patients who were given a card for fecal occult blood testing and were less likely to return it included younger Veterans; women; non-Caucasians; those who lived in the Northeast; people who currently smoke; and those who had not been recently vaccinated for influenza.

Glenn Cuff served as a diabetes peer mentor in a study at the Philadelphia VA Medical Center. PHOTO: TOMMY LEONARDI

Dr. Richard Hoffman shows stool-test kits that were mailed to eligible Veterans at home as part of a study. The kits boosted colorectal cancer screening rates.

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 are diabetes and high blood pressure. A study by researchers with VA and the University of California, San Francisco, found that cystatin C, a blood marker of kidney function, is significantly more accurate than the standard blood marker, creatinine, in predicting serious complications of kidney disease. Among adults who were identified as having kidney disease by high creatinine levels, the researchers found that only patients who also had abnormally high levels of cystatin C were at high risk for death, cardiovascular disease, heart failure, or kidney failure. People with high creatinine but normal cystatin C levels had risks similar to those with normal creatinine levels.

LUNG DISEASE

Breathing can be a challenge for people with compromised lungs, such as those suffering from asthma or chronic obstructive pulmonary disease (COPD)—an umbrella term that includes emphysema and chronic bronchitis. Working with researchers from Case Western Reserve University, VA's Advanced Platform Technology Center has designed an artificial lung that the research team calls "a significant step towards creating the first truly portable and implantable artificial lung systems." While heart-lung machines that in essence contain artificial lungs have been in use for years, they are bulky pieces of equipment that require pure compressed oxygen stored in heavy cylinders. A newer device now in clinical trials outside the United States is smaller and more portable, but still requires pure oxygen. The new VA-designed device is efficient enough to use air as the ventilating gas, as opposed to pure oxygen stored in a tank. It thus creates new possibilities for portability—and possibly implementation. Though years away from use in Veterans, the device could eventually be an option for those with failing lungs.

Diabetes and high blood pressure are the two main causes of kidney disease. PHOTO ISTOCKPHOTO/THINKSTOCK

VA researchers have made significant progress towards creating a portable and implantable lung system. PHOTO JUPITERIMAGES

CHRONIC PAIN

Pain is one of the most common reasons Americans consult a physician, and has been cited as the most common symptom in Service members returning from deployments. VA's pain research program covers a wide range of topics, from drug discovery to alternative treatments, to the impact of pain on daily function and quality of life. The SCAMP study (Stepped Care for Affective Disorders and Musculoskeletal Pain), a randomized clinical trial managed by the Richard E. Roudebush VA Medical Center and Indiana University, followed 250 Veterans with clinically significant depression for 12 months, along with 250 non-depressed Veterans with similar pain, in an effort to find a successful way to treat pain and depression when they occur together. The study's most recent findings, published in 2011 in the *Journal of Pain*, found that pain and depression are strongly related, and that 30 to 50 percent of Veterans with one condition also have the other. In those patients with both conditions, increases in levels of depression are likely to cause increases in pain, and vice versa. According to the authors, the two conditions need to be managed together, especially when treatment focused on either one is not leading to an optimal response.

PARKINSON'S DISEASE

VA treats at least 40,000 Veterans each year who have Parkinson's disease, a debilitating central nervous system disorder that can cause muscle rigidity, delayed movement, poor balance, and tremors. The Department has six Centers of Excellence focused on the disease, testing a variety of treatment approaches and studying the causes of the illness. VA is among the leaders in using deep brain stimulation, or DBS, a treatment that uses electrical stimulation in the brain to jam the brain signals that cause the symptoms of the illness. A recent study led by the Atlanta VA Medical Center and Emory University School of Medicine indicates that patients who recently developed Parkinson's disease have a high prevalence of vitamin D insufficiency—but that their levels of vitamin D do not appear to decline as the disease progresses. In addition, a study of 67 patients at the Baltimore VA Medical Center found that low-intensity workouts, stretching, and resistance exercise all improved the mobility of patients with Parkinson's disease. Those who walked on a treadmill at a comfortable pace for nearly an hour showed the most consistent improvement in gait and mobility.

A VA study has confirmed that yoga can relieve low-back pain and provide other health benefits. PHOTO KEVIN WALSH

Veteran Richard Hutton undergoes a check of the implant generator that is implanted within his chest, a part of the deep brain stimulation system. PHOTO: TOMMY LEONARDI

NOBELIST DR. ANDREW SCHALLY MARKS 50 YEARS WITH VA

Dr. Andrew V. Schally

November 2012 marks the 50th anniversary of service to Veterans for Dr. Andrew V. Schally, Distinguished Medical Research Scientist and head of the Endocrine, Polypeptide and Cancer Institute of the Miami VA Medical Center.

Schally began his life's work as a medical researcher in 1950, and has published more than 2,300 research papers in his long career—the highlight of which was sharing the Nobel Prize in Physiology or Medicine in 1977 with his VA colleague Rosalyn Yalow, PhD, who passed away in 2011.

Schally joined VA in 1962 and set up a lab devoted to research on the hypothalamus. His discovery that the hypothalamus links the nervous system to the endocrine system via the pituitary gland has been called the foundation of modern endocrinology. This discovery led to his Nobel award and to many major advances in the field of human reproduction and cancer treatment.

For the past 20 years, Schally and his laboratory have been synthesizing analogs of growth hormone-releasing hormone (GHRH) for therapeutic use in managing various cancers. GHRH stimulates secretion of growth hormone from the pituitary gland. Growth hormone then stimulates the production of an insulin-like growth factor that is a potent trigger for cell growth in many cancers.

Before developing agonists and antagonists to GHRH, Schally and his team also developed the preferred method for treatment of advanced prostate cancer, based on lutenizing hormone-releasing hormone (LHRH) agonists, now in wide clinical use. They have also demonstrated, in the lab, many potential new approaches to treating various other cancers.

According to Schally, "Although we've been able to accomplish a great deal experimentally, we can't be sure it works until we succeed with humans." Accordingly, a number of clinical trials testing his approach are under way around the world.

IN TRIBUTE TO DR. ROSALYN YALOW

Dr. Rosalyn S. Yalow

Rosalyn Susman Yalow, PhD, senior medical investigator emeritus at the Bronx VA Medical Center and the Solomon A. Berson distinguished professor-at-large at Mount Sinai School of Medicine in New York, died May 30, 2011, at the age of 89. Yalow was a co-winner of the Nobel Prize for Physiology or Medicine in 1977.

Yalow received her PhD in nuclear physics in 1945, and came to the James J. Peters VA Medical Center in the Bronx as a part-time researcher in 1947. She became a full-time employee in 1950, and in that same year began a collaboration with Berson that lasted until his death in 1972.

She and Berson discovered radioimmunoassay, an extremely sensitive way to measure insulin and other hormones in the blood. According to the *New York Times*, "The technique invigorated the field of endocrinology, making possible major advances in diabetes research and in diagnosing and treating hormonal problems related to growth, thyroid function, and fertility." Because it can also measure other substances in the blood, radioimmunoassay has come to be used in many other fields of medicine as well. William Bauman, MD, a physician with the Bronx VA Medical Center and Mount Sinai School of Medicine, told the *Washington Post*, "The technique revolutionized medicine. [It] took away the guesswork."

In awarding the Nobel Prize to Yalow, the Karolinska Institute in Sweden said that radioimmunoassay "brought a revolution in biological and medical research. We are witnessing the birth of a new era of endocrinology, one that started with Yalow."

Yalow was elected to the National Academy of Sciences in 1975, and received the Albert Lasker Medical Research award in 1976. According to the *Times*, in 1982 she told a group of schoolchildren what she believed a career in research was like. "Initially, new ideas are rejected," she said. "Later they become dogma, if you're right. And if you're really lucky you can publish your rejections as part of your Nobel presentation!"

GULF WAR VETERANS' ILLNESSES

To address the medical problems that still affect Veterans of the 1990-1991 Gulf War, VA's Office of Research and Development (ORD) is preparing a Gulf War Research Strategic Plan. In doing so, ORD has enlisted advisory committee members, Gulf War researchers, Gulf War Veterans, and others to make suggestions on future research directions and areas of emphasis.

Troops arriving to take part in the Persian Gulf War.

With input from dozens of stakeholders and experts, the plan is nearly complete as of the printing of this "State of VA Research" report, but it will be reviewed annually and modified as appropriate. ORD also participates, along with other units within VA, in the Gulf War Veterans' Illnesses Task Force. This group is concerned with every aspect of a Gulf War Veteran's experience within VA, and the preliminary draft of the group's annual report was posted on a Web site to allow interested parties to comment. This direct feedback helps VA ensure that its activities are aligned with the medical needs of Veterans.

ORD's emphasis is on research that can help us understand how best to treat ill Veterans. Two recent studies supported by ORD demonstrate this idea as it applies to Gulf War Veterans.

One study found that 96 percent of Veterans with chronic multisymptom illness experienced sleep-disordered breathing, while only 36 percent of their asymptomatic counterparts did. The study also showed that nasal continuous positive airway pressure (CPAP) can help alleviate breathing and sleep problems. Some Veterans receiving the CPAP therapy reported reductions in pain and fatigue, along with improvements in cognitive function, sleep quality, and general health. This pilot study will be expanded so that CPAP therapy can be more fully characterized in Gulf War Veterans.

A magnetic resonance imaging (MRI) study compared two groups of Veterans—one made up of Gulf War Veterans who were likely exposed to organophosphate chemicals, the other composed of Veterans who were not exposed. The imaging study identified brain differences between the two groups. While more testing needs to be done, this finding may lead to a reliable method for identifying Veterans with chronic multisymptom illness.

In addition to these completed studies, ORD supports ongoing research to address the chronic pain and cognitive and memory issues that affect many Veterans.

For example, resistance exercise training is being evaluated as a treatment for chronic muscle and joint pain. Pain symptoms, changes in physical activity, and the overall well-being of patients—including sleep problems, fatigue, anxiety, and depression—are being evaluated through various measures, including MRI studies of the brain's pain centers. The expected outcome is that patients receiving the intervention will have reduced pain and more normalized physical function, and that MRIs will prove valuable both as a diagnostic test and as a way to monitor patients' progress and well-being.

Another ongoing study has linked exposure to some of the same chemicals that were present in the Persian Gulf region with cognitive and memory problems, and with changes in a region of the brain known as the hippocampus. The next phase of the study involves treatments with a combination of drugs that could help repair the hippocampus.

Other new studies will use magnetoencephalography (MEG) to study cognitive brain processes and repetitive transcranial magnetic stimulation (rTMS) to treat chronic pain in Gulf War Veterans. MEG detects very weak magnetic signals produced in the brain. Studying these signals can help determine which parts of the brain are functioning normally and which are not. TMS uses brief pulses of a magnetic field to non-invasively stimulate areas of the brain. TMS has been found safe and effective in treating patients with depression or stroke.

MILITARY DOGS YIELD CLUES FOR RESEARCHERS

Most dog owners will testify that a dog is man's best friend—and some military dogs are continuing to offer support even years after their deaths.

VA researchers are looking at medical records and stored tissue samples from 450 military dogs deployed to the Middle East between 2003 and 2007 to see whether they hold clues to illnesses suffered by troops sent to the region.

Sgt. Anoushka, a Tactical Explosive Detection Dog, has just found a detonation cord in a training exercise, and now stands at attention to let his handler know that he has found some explosives.

The idea was suggested in the 2010 report of VA's Gulf War Veterans' Illnesses Task Force to the Secretary of Veterans Affairs. According to the task force, "The use of military working dog health records may add information to the potential long-term adverse health effects among Veterans exposed to the same environmental hazards."

The researchers are reviewing records from the Military Working Dog Center at Lackland Air Force Base, Texas, and specimens from animal autopsies at the Joint Pathology Center in Silver Spring, Md., to see if the dogs' health histories can provide insight into current and future health concerns in humans.

Dr. Michael R. Peterson, VA's Chief Consultant for Post-Deployment Health, told the *Army Times* that the dogs' records could serve as health sentinels, much like a canary in a coal mine.

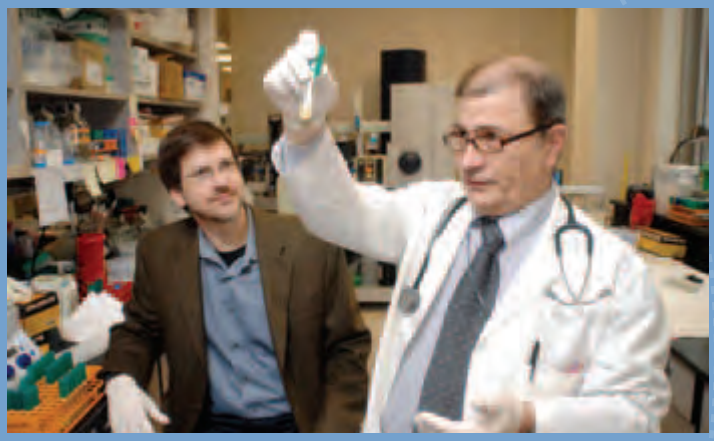
"When the bird fell over, you knew it was time to get out of the coal mine," said Peterson. "There is some literature out there that has looked at things like cancers in animals that may have been related to environmental causes; there's a consensus that this is worth exploring."

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. Here are some recent advances VA researchers have made:

TUBERCULOSIS

Tuberculosis, commonly called TB, is a bacterial disease that is spread through the air from one person to another. It can be fatal if not treated properly. In 2011, a team of international researchers, including VA investigators, found that patients at high risk for contracting TB can avoid developing the disease by taking a combination of drugs (rifapentine and isoniazid) once a week for three months. This combination works as effectively as the current standard of care, which involves taking isoniazid alone every day for nine months. More than 7,700 high-risk individuals from Brazil, Canada, and the United States participated in the study, many of whom were Veterans who receive their health care from VA. Six VA hospitals throughout the nation participated in the study. The findings have already been recommended to physicians throughout the nation by the Centers for Disease Control and Prevention.



Dr. Robert A. Bonomo (right) and colleague Dr Mark Adams are studying the genetic make-up of Acinetobacter baumannli. a species of bacteria that is resistant to most antibiotics. PHOTO: TIM HARRISON

HIV/AIDS

HIV is the human immunodeficiency virus. It is the virus that can lead to acquired immune deficiency sydrome, or AIDS. VA is the largest single provider of HIV care in the United States, providing care for more than 24,000 Veterans with HIV. The Department encourages every Veteran to get tested for HIV at least once. To help promote early diagnosis of HIV and to simplify the

PHOTO: LAMEL HINTON

process, VA revised its policy on HIV testing and informed consent in 2009. Today, written informed consent is no longer required for HIV testing; instead Veterans can provide verbal consent for voluntary testing. Also, lengthy pre- and post-test counseling is no longer required; instead, providers must give patients written materials on HIV. VA's Public Health Strategic Healthcare Group looked at the effects of these new policies and found that the number of Veterans tested for HIV in 2010 was more than double the number tested in 2009. In addition, the number of Veterans who had ever been tested for the virus rose by 50 percent. In 2009, only 2.5 percent of VA's 5.7 million outpatients had ever been tested for HIV; by 2010, that figure had jumped to 13.6 percent. VA researchers at the Greater Los Angeles VA Medical Center previously found that rapid testing for HIV can improve testing rates. In a 2011 study of 65 mental health and substance abuse patients, VA researchers in Philadelphia found that a quick, oral-fluid test for HIV, given by nurses familiar with the patients, was a highly effective screening tool. This kind of testing involves an oral swab and makes results available in 20 minutes. All but one of the Veterans in the study agreed to be tested, and the HIV prevalence among the group was found to be 3 percent—about six times higher than the rate for the general U.S. population. VA is now piloting the rapid test in homeless shelters and VA community-based outpatient clinics. It is already in use in the Philadelphia VA's addiction recovery unit.

INFLUENZA

Influenza is a serious illness. According to the Centers for Disease Control and Prevention, from 1976-77 through 2006-2007, flu-related deaths in the United States ranged from a low of about 3,000 to a high of about 49,000 people per year, and each year more than 200,000 people are hospitalized from the flu. CDC recommends getting a yearly flu vaccination as the first and most important step in protecting against the viruses. While VA has set a goal of providing seasonal influenza vaccination to 85 percent of its health care employees and to all of its Veteran patients, many people are still not vaccinated. Researchers at the Hines (Ill.) VA hospital and Northwestern University used a statistical model to explore whether it would be cost-effective to offer flu vaccination to older adults in hospital emergency rooms. They found that vaccinating patients aged 50 or older would cost hospitals approximately $35,000 for every life the vaccinations saved, which is considered very cost-effective by health economists. Limiting vaccinations to those older than 65 was even more cost-effective: it would cost hospitals only $13,000 for every life such vaccinations saved. CDC recommends everyone six months or older should be vaccinated annually.

Dr. Laurence Buxbaum contributed to a VA study of a rapid oral test for HIV infection.
PHOTO: TOMMY LEONARDI

Dr. Michael Simberkoff administers the shingles vaccine to Veteran Marco Antonio.
PHOTO LAMEL HINTON

PNEUMONIA

Older men hospitalized with pneumonia may also be at risk of heart problems. In 2011, the South Texas Veterans Health Care System completed a national cohort study of the records of more than 50,000 patients aged 65 and older, with an average age of about 77, admitted to VA hospitals. The investigators found that about 10 percent of those Veterans experienced congestive heart failure within 90 days of their admission to the hospital. Virtually the same percentage experienced an arrhythmia (a problem with the rate or rhythm of the heartbeat). Another 1.5 percent had a heart attack, 0.8 percent developed unstable angina (a condition in which the heart doesn't get enough blood flow and oxygen), and 0.2 percent had a stroke. Most of these events occurred while the patients were in the hospital. The study's authors suggested that cardiovascular events may be a principal reason for death following the onset of pneumonia in older people, and recommend further studies to determine whether interventions can reduce the frequency of these events.

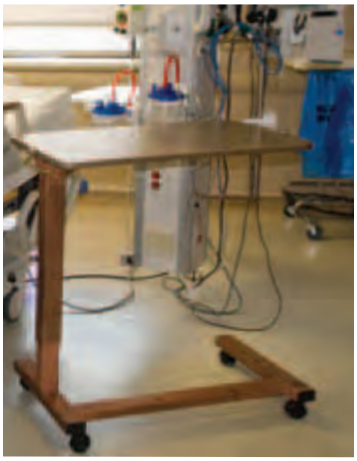
VA's Dr. David Canaday studies infectious diseases such as tuberculosis and influenza. PHOTO JASON MILLER

COPPER'S GERM-KILLING ABILITY

Since ancient times, copper has been known for its ability to kill bacteria. Recently, researchers at three hospitals—the Charleston VA Medical Center, the Medical University of South Carolina, and Sloan Kettering Cancer Center in New York—put the metal's antimicrobial properties to the test.

The research team replaced surfaces in eight intensive care rooms including bed rails, tray tables, nurse call buttons, and IV poles—the surfaces in patient rooms most likely to carry harmful germs—with antimicrobial copper versions.

They then followed more than 550 patients who were admitted to those rooms, or to eight standard rooms used as controls, from July 2010 through May 2011. They found the use of antimicrobial copper surfaces in these rooms cut the amount of bacteria in the rooms by 97 percent, and also resulted in a 41 percent drop in the rate of hospital-acquired infections.



Copper components such as this over-bed tray were installed in an ICU room as part of a study on the metal's germ-killing effects.

They even found there may be a "dose effect"—the more copper surface exposure, the less risk patients have of acquiring a hospital-acquired infection.

Joseph John, MD, an infectious-disease specialist at the Charleston VA Medical Center, called copper "an amazing material." He said the fact that copper is always active in killing bacteria, without any human intervention, "makes it an ideal second line of defense to good infection control practices."

His study counterpart at Sloan Kettering, Kent Seplowitz, MD, told *Crain's Health Pulse*, "We were stunned by the results." He added that while scientists don't exactly know how copper kills microbes, the chemical effect may be something akin to electrocution.

Daniel Sexton, MD, of Duke University Medical Center, who was not part of the study, told *MedPage Today* that the findings are "very dramatic," but need to be replicated. "Real technology is simple, cheap, and it works," he said. "This is what this is."

MENTAL HEALTH

VA's goal is to provide mental health services that are evidence-based, Veteran-centric, and accessible. VA investigators support this effort by developing and evaluating potential approaches for treating and preventing a wide range of mental health disorders. Some of this work includes developing and evaluating collaborative primary care models, and improving access to services from remote areas through the use of videoconferencing and other technologies.

A Veteran at the Charleston VA Medical Center is taking part in a study that will compare psychotherapy for depression delivered by videophone with in-person care. PHOTO: STACY PEARSALL

A study published in 2011 in the *Journal of General Internal Medicine* included a review of mental health data on more than 456,000 Iraq and Afghanistan Veterans who enrolled in VA health care between 2002 and 2009. The investigators, with VA and the University of California, San Francisco, found that around 11 percent of the patients had received a diagnosis of an alcohol or drug use disorder. About 1 in 10 Veterans had an alcohol use disorder and 1 in 20 had a drug use disorder. Male sex, age under 25, never-married or divorced status, and greater combat exposure were linked with higher rates of drug and alcohol disorders.

Of those Veterans with an alcohol or drug use disorder, up to three-quarters also received a diagnosis of PTSD or depression. In other terms, those with PTSD or depression were around four times more likely to have a drug or alcohol problem. The rates found in the study were close to those seen in earlier studies of Vietnam Veterans. Lead investigator Karen Seal, MD, MPH, said the findings support the need

for "increased availability of integrated treatments that simultaneously address [alcohol and drug use disorders] in the context of PTSD and other deployment-related mental health disorders."

In 2011, nearly 150,000 Veterans spent at least one night in an emergency shelter or transitional housing program over the course of the year. A recent VA study compared one-year clinical outcomes in a group of homeless female Veterans with psychiatric and substance use disorders who did or did not receive at least 30 days of residential treatment. The study found that women who participated in a residential treatment program had better outcomes on employment, social support, housing status, and psychiatric symptoms, suggesting that VA residential treatment may improve mental health outcomes in women Veterans struggling with homelessness.

VA and the Department of Defense have joined together to implement a multidisciplinary research approach to preventing suicide among Service members and Veterans. Called the Military Suicide Resource Consortium, the program aims to enhance VA and DoD's ability to quickly identify those at risk for suicide and provide evidence-based prevention and treatment strategies. A 2011 study, led by Lisa M. Brenner, PhD, of the VISN 19 Mental Illness Research Education and Clinical Center, found that Veterans with a history of traumatic brain injury were at a higher risk for suicide compared with those without a history of TBI. Taken together with other study findings, such information helps VA design, implement, and refine effective suicide-prevention strategies.

In one further example of 2011 research in this area, VA's Mental Health QUERI (Quality Enhancement Research Initiative) interviewed experts, conducted a literature review, and convened a national panel to forge recommendations on standardized outcome measures for studies on schizophrenia. The study found strong consensus in domains such as psychotic symptoms, medication side-effects, substance use, depression, and vocational functioning.

DEPRESSION-HEART DISEASE LINK

In a 2011 study that added to the growing literature on the link between depression and heart disease, VA investigators in St. Louis and Little Rock analyzed VA electronic health records to identify nearly 346,000 VA patients, aged 25 to 80, who were free of cardiovascular disease in 1999 and 2000. The authors then stratified the patients into four groups: those with neither diabetes nor major depression; those with major depression alone; type 2 diabetes alone; and major depression together with type 2 diabetes.
The study showed that compared with patients without either condition, those with diabetes alone and those with major depression alone were at about 30 percent increased risk for heart attack. Patients with both type 2 diabetes and major depression were at 82 percent increased risk for heart attack. The authors concluded that "as compared to patients with only diabetes or only [major depression], persons with both type 2 diabetes and [major depression] are at increased risk for new onset [heart attack]." They suggested that "monitoring cardiovascular health in depressed patients with type 2 diabetes may reduce risk of [heart attack] in this especially high risk group."

MIND OVER MATTER

Read about a 2011 VA study on a mindfulness program that is helping Veterans cope with a potentially debilitating gut disorder.

Visit VA Research Currents at

www.research.va.gov/currents/sept11/sept11-01.cfm.

PERSONALIZED MEDICINE/ GENOMICS

A breath alcohol test, given here by nurse Trisha Stump, is part of the clinical exam for volunteers taking part in a VA study on naltrexone, a long-standing treatment for alcoholism.
PHOTO:TOMMY LEONARDI

The Office of Research and Development is at the forefront of developing safer, more effective treatments based on new knowledge about the role of genes in health and disease. The goal is to provide medical care that is personalized to the genetic makeup of individual Veterans. This approach is referred to as personalized medicine.

One of 2011's most important developments in VA research was the launch of the Million Veteran Program (www.research.va.gov/MVP), a partnership with Veterans that aims to build one of the world's largest databases of genetic, military exposure, lifestyle, and health information.

Genes, which are made up of DNA and are inherited, are the instructions for building and maintaining our bodies. They determine the color of our eyes and hair, our height, other personal traits, and many factors relating to our health. Certain genes may contribute to our risk for disease, including illnesses such as heart disease, diabetes, and cancer. Genes may also affect how we respond to certain medications. A better understanding of how genes affect health, scientists believe, will lead to better preventive strategies and treatments.

MVP promises to substantially advance this goal. VA is seeking blood samples from one million Veteran volunteers throughout the nation. The blood samples, which contain DNA material, will be stored anonymously for future research.

Veterans who choose to participate in MVP are asked to fill out surveys about their health and health-related behaviors, and to complete an optional health assessment. They are also asked to allow authorized VA researchers to confidentially access information from their medical records, and to allow VA researchers to contact them in the future.

Research assistant Shelly Amberg with Dr. Pantel Vokonas, VA Boston cardiologist, Vietnam Veteran, and MVP participant.
PHOTO: FRANK CURRAN

The program has extensive safeguards in place to ensure that information security and patient confidentiality are top priorities. It is open to all Veterans receiving care in VA's health care system, and is being rolled out to all VA medical centers in phases. As of February 2012, 40 VA health care facilities were accepting volunteers, and more than 64,000 Veterans had either completed their study visit or begun the process. Whenever a new site is opened for enrollment, all Veterans who use the facility will receive a letter of invitation to participate in MVP. VA Research deeply appreciates the participation of so many Veterans in MVP and in other VA studies.

ZEROING IN ON GENE THAT AFFECTS BRAIN HEALTH

A variation in the coding pattern of a single gene significantly affects the rate at which men's intellectual function drops as they grow older, suggests a 2011 study by a team with the VA Palo Alto Healthcare System and Stanford University.

Researchers tested 144 middle-aged and older airplane pilots on flight simulators three times over two years, and found that having one version of the gene, as opposed to the other, doubled the rate of declines in performance. The genetic variation implicated in the study has been linked previously to several psychiatric disorders.

According to lead author Ahmad Salehi, MD, PhD, the study provides the first evidence of the gene's impact on skilled task performance on the healthy aging brain. Using MRI brain scans, the researchers also found greater volume loss in the hippocampus (a brain region crucial to memory and spatial reasoning) in pilots with the genetic variant.

The gene in question codes for brain-derived neurotrophic factor, or BDNF, a key protein in the central nervous system. Usually, the BDNF gene dictates that the amino acid valine be present in a particular spot on the protein. A less common variant results in a different amino acid, methionine, residing in that same location. The variant has been linked to higher risk for depression, stroke, anorexia nervosa, anxiety-related disorders, suicidal behavior, and schizophrenia.

Based on DNA samples, 55 of the 144 men in the study were found to have at least one copy of a BDNF gene with the methionine variant. Performance dropped more sharply among these pilots over the two-year study, even after researchers adjusted for the pilots' level of experience and other factors that could affect performance. A longer follow-up study is now in the works.

Study coauthor Dr. Joy Taylor oversees a flight simulation test at a VA-Stanford University lab in Palo Alto.
PHOTO: CHUCK REVELL

PROSTHETICS AND RELATED TECHNOLOGY

VA supports a wide array of research in engineering and technology to improve the lives of Veterans with disabilities. Research is being carried out on a number of leading-edge technologies such as advanced wheelchair designs; regenerative medicine to regrow vital nerve connections and body tissues; the creation of advanced prosthetic limbs that are powered by batteries and controlled by computer microprocessors; neural control of prosthetic and assistive devices; and the development of new applications for functional electrical stimulation to help those with weak or paralyzed muscles.

One of VA's most exciting prosthetic projects is testing one of two high-tech prosthetic arms being developed for the Department of Defense's Defense Advanced Research Projects Agency. The DEKA Arm, nicknamed "Luke" after the Star Wars hero Luke Skywalker, is a robotic arm with a fully functioning hand. Its control is so precise that users can pick up a grape without crushing it, or hold and operate a power drill.

The arm also features innovative control systems, such as shoe-mounted sensors. When the user pushes down with his left big toe, for example, the hand moves out;

when he pushes down with the right big toe, the hand moves back in. Throughout 2011, VA made substantial progress on a clinical optimization study of the arm in which feedback from Veteran users and VA prosthetists is being used to help DEKA's engineers refine the arm's design and function.

Other important prosthetics work is being conducted through a collaboration between the Puget Sound VA and the University of Michigan. The group is developing technology known as Controlled Energy Storage and Release (CESR) to boost the performance of an artificial foot. A microprocessor-controlled spring mechanism stores energy when the foot contacts the ground and releases it later to aid performance.

In April 2011, the technology was demonstrated to VA Secretary Eric K. Shinseki and U.S. Senator Patty Murray during their visit to the Puget Sound VA's Center of Excellence for Limb Loss Prevention and Prosthetic Engineering. The visitors also received a briefing from VA's William Ledoux, PhD, who described his group's work on a three-dimensional X-ray system that tracks the motion of individual foot bones. The goal is to study bone motion in healthy patients versus diabetic patients, who are at risk for serious foot ulcers that can lead to amputation. In addition to leading-edge work on prosthetics, the center has a major focus on preventing limb loss in Veterans with diabetes.

Secretary of Veterans Affairs Eric K. Shinseki visited the Center of Excellence for Limb Loss Prevention and Prosthetic Engineering in Seattle on April 29, 2011, to learn about how the Center's research impacts the lives of Veterans.

BIONIC ANKLE NOW AVAILABLE TO VETERANS

In 2007, Army Veteran Garth Stewart demonstrated a remarkable new advance for people who have had lower-limb amputations. At the Providence, R.I. VA Medical Center, Stewart—who lost his left leg below the knee in an explosion in Iraq—walked in a brand-new powered ankle-foot prosthesis unlike any that had ever been used before.

A team with VA, the Massachusetts Institute of Technology, and Brown University developed the prosthesis. It includes a battery, a motor, sensors, microprocessors, gyroscopes, and other components that allow it to emulate the performance of a natural ankle during level-ground walking, for a range of walking speeds. It uses robotics to replicate muscles and tendons that replace the action of the foot, Achilles tendon, and calf muscle.

Randall Tipton, a 20-year U.S. Army Special Forces Veteran who served in Iraq and Afghanistan, with Mark Benveniste, R.N., a certified prosthetist at the Michael E. DeBakey VA Medical Center in Houston, Tex.
PHOTO: BOBBI GRUNER

A study published in 2011 demonstrated that the latest version of this device can restore almost-natural walking ability to people who have had amputations similar to Stewart's. In the research, co-authors Hugh Herr, PhD, and Alena Grabowski, PhD, studied seven volunteers with below-knee amputations who used the bionic ankle. The study compared their walking abilities with the same volunteers' abilities using their standard prostheses—and also with the walking abilities of seven non-amputees. The study concluded that "using the bionic prosthesis resulted in metabolic energy costs, preferred walking velocities, and biomechanical patterns that were not significantly different from people without an amputation."

The bionic foot-ankle device is now available to Veterans and active duty Service members who have undergone below-knee amputations, and is being made available to non-Veterans by the bionics company iWalk under the name "Power Foot BiOM."

POSTTRAUMATIC STRESS DISORDER

Posttraumatic stress disorder (PTSD) can occur after someone goes through a traumatic event such as combat, an assault, or a natural disaster. Most people have some stress reactions after a trauma, such as upsetting memories of the event, increased jumpiness, or trouble sleeping. People whose reactions don't go away over time or cause disruptions in their lives may have PTSD.

The experience of being in a combat situation is a possible trigger for posttraumatic stress disorder.

VA supports numerous studies aimed at understanding, treating, and preventing PTSD. These studies range from investigations of the genetic or biochemical underpinnings of the condition to evaluations of new or existing treatments, including large clinical trials.

In a step towards speeding progress on research focused on PTSD and traumatic brain injury, VA recently collaborated with the Department of Defense and the National Institutes of Health to identify key PTSD-related characteristics and evidence-based measures that might be used by all three agencies, and others, in future research. The work group's effort has contributed to more effective integration and synthesis of knowledge relating to PTSD and TBI, with the ultimate aim of benefiting the lives of all who experience trauma.

In 2011, VA's Vietnam Era Twin Registry yielded information that may help predict whether some people are at higher-than-normal risk for developing PTSD. The registry

is one of the largest national twin registries in the United States, and has been in existence for more than 20 years.

Researchers led by Natasha B. Lesko, PhD, of the Manchester (N.H.) VA Medical Center, found that an area of the brain called the dorsal anterior cingulate undergoes increased activation in response to stimuli in Veterans who developed PTSD and their twins, compared with Veterans who did not develop PTSD and their twins. The dorsal anterior cingulate is a brain region thought to be involved in decision-making, performance monitoring, and other cognitive processes. The study added to the growing body of literature on the brain changes associated with PTSD, all of which may lead to improved preventive measures and treatments in the future.

In one further example of promising VA research in this area, a pilot study at VA's Tampa and Minneapolis VA medical centers found that Veterans with PTSD and mild to moderate traumatic brain injury showed substantial benefit from prolonged exposure therapy. Exposure therapy, in which patients emotionally relive their traumas in a safe, controlled manner, is one of two therapies widely used in VA to treat PTSD, but therapists have been reluctant to use it for patients who also have TBIs because of complications that might arise from their injury.

INSIDE PTSD: VA RESEARCHER'S BOOK OFFERS COMPELLING ACCOUNT THROUGH VETERANS' STORIES

The work of VA researcher and medical anthropologist Erin Finley, MD, MPH, has taken her to one of the United States' hubs for military personnel and Veterans: San Antonio. Read more about her 2011 book *Fields of Combat: Understanding PTSD Among Veterans of Iraq and Afghanistan* in VA Research Currents at

www.research.va.gov/currents/feb12/feb12-04.cfm.

MEETING TO EXPLORE ALTERNATIVE APPROACHES TO PTSD

More than 30 experts attended a recent VA Research meeting on complementary and alternative medicine for PTSD.

In May 2011, VA's Office of Research and Development convened a meeting of experts from VA, the Department of Defense, the National Institutes of Health, and academic centers to explore the existing evidence on complementary and alternative medicine (CAM) for PTSD, and to forge a future research agenda in this area.

According to survey results presented at the meeting, 9 in 10 VA facilities now offer some form of CAM, such as meditation, massage, and yoga, either in-house or through referrals to outside contractors. The most common forms are meditation or other relaxation techniques.

At the meeting, VA Deputy Secretary W. Scott Gould said: "We've done a lot of work in many areas of PTSD research that has produced effective treatments, but we are not done preventing, relieving, or curing PTSD in all Veteran patients. And that is why we need to keep our curious minds open and receptive to new ideas. In addition to the outstanding medical care we already provide, we are learning to extend that care to include many CAM treatments."

As a result of the meeting and related work, VA is now funding three new clinical trials on using meditation in PTSD treatment, in San Diego, Tuscaloosa, and Minneapolis. The San Diego trial focuses on the Mantram Repetition Program, a technique involving silently repeating a specific word or phrase with spiritual meaning throughout the day and during stressful times. The Tuscaloosa and Minneapolis programs focus on Mindfulness-based Stress Reduction, an approach that was initially developed at the University of Massachusetts in the late 1970s and is highly regarded nowadays in mainstream medicine as a way to help patients cope with a variety of health conditions.

RURAL HEALTH

Many Veterans who rely on VA for their health care live in remote rural areas—in some cases, hundreds of miles from the nearest VA facility. Over the past 10 to 15 years, VA has launched a number of initiatives to expand and ensure access to high-quality health care for these Veterans. VA's three-pronged strategy to meet the needs of rural Veterans includes providing additional sites for care; using new technologies such as telehealth and telemedicine; and partnering with non-VA providers.

On average, according to VA's Health Services Research and Development's *Forum* newsletter, rural Veterans travel between 60 to 120 minutes for inpatient care, and 30 to 90 minutes for primary care. One-third of Iraq and Afghanistan Veterans live in rural or highly rural areas; and three-fourths of rural Veterans are over the age of 55. In addition, two in five VA health care enrollees are rural residents. Rural enrollees are slightly more likely than urban ones to use VA care (68 percent versus 65 percent), and from 2006 through 2009 the number of rural enrollees grew faster (by 11 percent) than the number of urban enrollees (by 2 percent).

A 2011 Evidence-based Synthesis Program review by researchers at VA's Minneapolis Health Care System looked at the overall issue of ambulatory care in rural versus urban areas. They reviewed more than 1,300 studies on the issue that have been published in the United States since 1990. The research team found only weak evidence that rural health care disparities exist in some areas, such as mental health care; however, they also found large gaps in the evidence base, and virtually no research in many areas important to VA and Veterans, such as traumatic brain injury.

Among the specific findings was that there was no difference between urban and rural Americans in the rates of influenza or pneumonia vaccinations they received. There was also no conclusive evidence that women received better prenatal care in either rural areas or cities. The researchers did, however, find that Americans living in rural areas were screened for colorectal cancer at lower rates than urban Veterans. They also found evidence that suicide rates among Americans might be higher in rural areas, and that people living in rural areas were hospitalized less frequently for schizophrenia and depression than their urban counterparts.

Another study in this area was conducted in 2011 by the Office of Rural Health's Veterans Rural Health Resource Center at the Iowa City VA Medical Center. Researchers found that in both 2005 and 2009, Veterans living in the most remote rural areas were significantly less likely than persons living in the most urban areas to have been tested for HIV, the virus that causes AIDS. In 2005, according to the study, 11.5 percent of Veteran patients in metropolitan areas were tested for HIV, compared to 8.7 percent in non-metropolitan areas. In 2009, 11.4 percent of patients in metropolitan areas received testing, compared to 7.7 percent in non-metropolitan areas. The researchers urged that additional strategies be considered to increase HIV testing in rural areas.

STUDIES HIGHLIGHT BENEFITS OF TELEHEALTH

John Fortney, PhD (on screen), and Jeffrey Pyne, MD, are leading a study using videoteleconferencing to provide PTSD care to Veterans in Arkansas, Louisiana, and California, mostly in rural areas. PHOTO: JEFFERY BOWEN

Telehealth is the delivery of health-related services and information through telecommunications technologies. VA uses three types of telehealth to support Veterans:

Real-time clinic-based telehealth allows Veterans visit a nearby hospital or clinic to consult with specialists at remote locations, usually through videoconferencing. VA clinicians use this method to make diagnoses, manage care, perform checkups, and actually provide care.

Care coordination/home telehealth uses new technologies to allow clinicians to check on symptoms and measure Veterans' vital signs, such as pulse, weight and temperatures at the patient's home. Regular telephone lines can connect a Veteran to a VA hospital or clinic—making it easier for rural Veterans and others to get treatment.

Store-and-forward technology allows clinical information such as data, still images, video, and sound to be forwarded to or retrieved by another site for clinical evaluation. Store and forward is often used to enable doctors to read X-ray images, to screen the retinas of diabetics, and for dermatology examinations.

VA researchers are assessing the quality of telehealth initiatives and helping develop new ways in which technology can bring care closer to where rural Veterans live. A study published in 2011 by VA researchers included an in-depth look at patient satisfaction with telehealth services. The research found that patients thought very highly of the program overall, but were occasionally frustrated by equipment problems and slow responses.

Another study found that group cognitive processing therapy, one of VA's most effective treatments for posttraumatic stress disorder, could be conducted by teleconference as effectively as in-person.

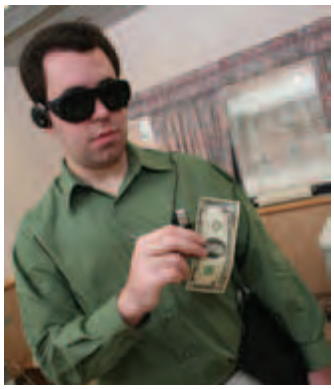
A third study described the value of telehealth in identifying and treating severe psychiatric illnesses, and the ways in which one Veteran, taking part in a research trial on telehealth, was prevented from attempting suicide through prompt diagnosis and intervention.

HARNESSING NEW TECHNOLOGY TO HELP GUIDE THE BLIND

Many blind Veterans use seeing eye dogs and long white canes to find their way—but a new generation of digital aids is emerging. It's no longer uncommon to see people with vision loss using talking handheld Global Positioning System (GPS) devices, often together with a guide dog, to navigate city streets.

There are limits to what GPS devices can do, however. Directions for pedestrians can be off by 50 or even 100 feet in certain instances. Clouds or tall buildings can block signals, and indoors, GPS may not work at all. Even under ideal conditions, consumer GPS devices are usually accurate to only about 10 feet—the difference between walking on the sidewalk and veering into the street.

A VA-funded group of researchers associated with the Baltimore VA Medical Center and the University of Maryland is designing a computer vision system to bridge these limitations and offer added mobility and independence for Veterans with vision loss. Once it is operational, blind people will wear stereo headphones with a small webcam and microphone attached to their lapel. The devices will be wired to a small laptop, carried in a backpack.



The new computer vision system being designed at the Baltimore VA Medical Center can help visually impaired Veterans to recognize denominations of money.

When the user gives a command, such as "find the restroom," the computer compares the webcam's views with images of the area around the target that have been pre-loaded onto the computer. Beeps, audio signals, and computer-generated speech indicate how the user should proceed. In the future, the platform being used to build this system could be used for money recognition, finding lost objects, and even facial recognition.

SENSORY LOSS

Sensory loss is defined as a decreased ability to respond to stimuli that affect our senses, such as sight, hearing and touch. VA researchers, engineers, and clinicians work in many areas of sensory loss, especially those involving hearing and vision loss.

To combat vision loss, researchers are designing new assistive devices for the visually impaired and improving existing ones. They are exploring the use of GPS and other technologies, such as infrared signals or computer vision, to aid indoor and outdoor navigation for blind Veterans.

Hearing loss affects some 28 million Americans and is the most frequently found service-connected disability among Veterans. VA researchers are studying ways to prevent, diagnose, and treat hearing loss. They are also addressing a wide range of technological, medical, rehabilitative, and social issues associated with tinnitus, a potentially debilitating condition that often accompanies hearing loss and involves ringing, whistling, or other noises in the ears.

Much of VA's research in the area of hearing loss takes place at the National Center for Rehabilitative Auditory Research (NCRAR) at the Portland VA Medical Center.

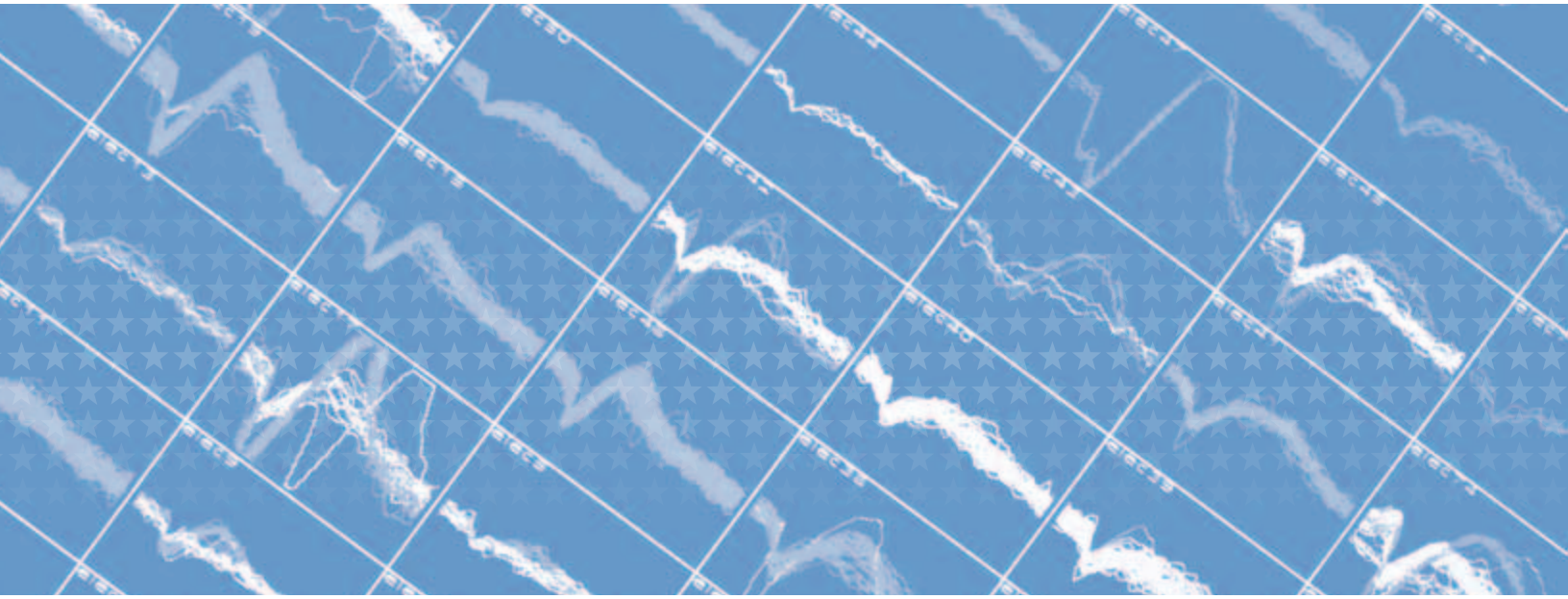
In 2011, researchers at the center published a study on the prevalence of tinnitus among male Veterans in the United States, including both those who use VA for care and those who do not.

Analyzing data on more than 2,000 Veterans and about 5,000 non-Veterans, the center found that overall, 11.7 percent of Veterans reported tinnitus, compared with 5.4 percent of non-Veterans. The data suggest that the percentage of Veterans with the problem will continue to grow as today's Veterans age. As a result, concluded the study's authors, VA must prepare for an ever-increasing number of Veterans seeking care and compensation for hearing loss and tinnitus.

Also in 2011, VA researchers developed a new clinical measure for chronic, intrusive tinnitus. Based at NCRAR, the research team created a questionnaire, called the Tinnitus Functional Index, to assess the outcomes of treatment for the problem. It is the first tinnitus questionnaire that has been especially developed and validated to detect changes in the severity of tinnitus achieved through treatment interventions. Because it can reliably detect the severity of the condition in patients, and improvements in patient status, the tool stands to benefit both clinicians and researchers.

Gregory Goodrich, PhD, is the coordinator of the optometry research fellowship program at VA's Palo Alto Health Care System.

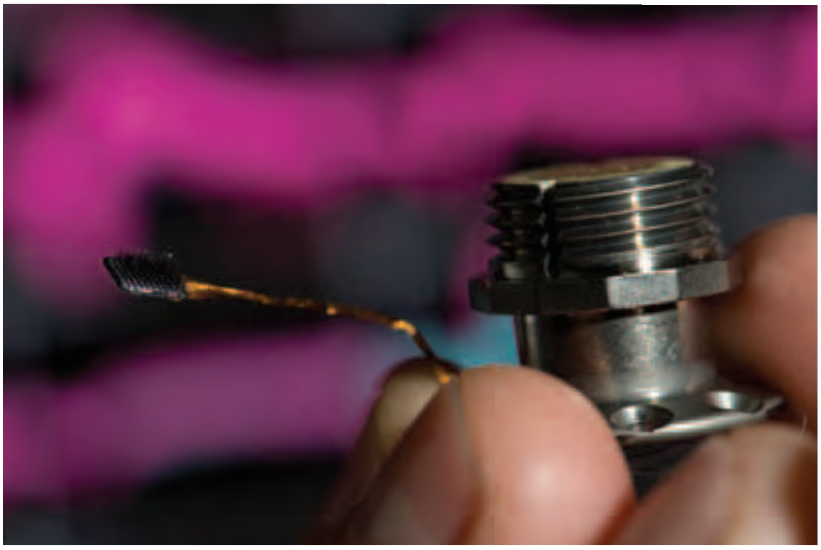
In the area of vision loss, VA researchers at the Indianapolis VA Medical Center found that after adjustments for race and age, current and former cocaine users among Veterans had a 45 percent higher risk of open-angle glaucoma (the most common form of the illness) than Veterans who had never been exposed to illegal drugs. According to the study's first author, Dustin French, PhD, "While the association of illegal drug use with open-angle glaucoma requires further study, if the relationship is confirmed, this understanding could lead to new strategies to prevent vision loss."



SPINAL CORD INJURY

More than 225,000 people in the United States have some type of spinal cord injury or disorder that significantly affects their life activities. Of these, more than 25,000 receive care from VA. Persons with spinal cord injuries and disorders (SCI&D) live with a condition that requires ongoing management, as well as constant vigilance to ward off or minimize secondary complications.

One of the most exciting VA initiatives for Veterans with SCI&D, as well as those with ALS (Lou Gehrig's disease), stroke, and other nervous system disorders that result in paralysis, is a system called BrainGate, spearheaded by researcher John Donoghue, PhD, with VA and Brown University's Center for Restorative and Regenerative Medicine.



This pedestal is part of the BrainGate system, which may help provide new independence for Veterans and others affected by paralysis or limb loss.
PHOTO: FRANK CURRAN

The system 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 study published in 2011 found that the system continued to control a computer cursor accurately through brain activity more than 1,000 days after it was initially implanted.

Currently, the BrainGate research team is focused on enabling Veterans and others with paralysis to more easily use computer applications such as e-mail and word processing,

and to control prosthetic limbs or even their own limbs that no longer function. Future work may focus on enabling Veterans who have lost an upper limb to use BrainGate to directly control, through their thoughts, an advanced robotic prosthesis.

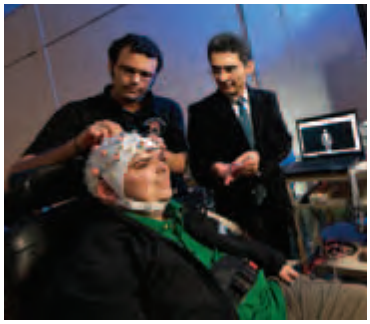
VA's Managing Obesity in Veterans Everywhere (MOVE!) program helps Veterans lose weight, keep it off, and manage their health. Nearly 66 percent of VA's SCI&D patients are either overweight or obese. In 2011, a team based at the VA Puget Sound Health Care System adapted current materials on weight management and physical activity on the VA MOVE! Program's Web site for Veterans with SCI&D. They also developed new materials on their own and received feedback on their work from Veterans with SCI&D and an expert panel.

Modifications to 22 existing pamphlets included the addition of wheelchair activities and photographs, safety tips, and ideas to help SCI&D patients perform physical activity safely. The team also developed five new pamphlets to help these Veterans exercise more productively. The MOVE! program will be using these materials to improve coordinators' ability to work with those who use a wheelchair for mobility.

Dr. John Simeral checks data from the BrainGate study at the Providence VA Medical Center.
PHOTO: FRANK CURRAN

'BRAIN CAP' TECHNOLOGY—ANOTHER WAY TO TURN THOUGHT INTO MOTION

While the BrainGate system being developed at the Providence VA Medical Center uses surgical implants to enable Veterans to use their thoughts to manage computers and other prosthetic and electronic devices, a 2011 study published in the *Journal of Neurophysiology* demonstrated the value of "Brain Cap" technology—another way for users to turn their thoughts into motion, in this case without surgery.



Alexander Presacco, a graduate student, adjusts a version of the Brain Cap headset. Looking on is laboratory director and Brain Cap creator Jose "Pepe" Contreras.

The "brain cap" is a non-invasive, sensor-lined cap with neural interface software that may soon be used to control computers, robotic prosthetic limbs, motorized wheelchairs, and even digital avatars. The VA Maryland Health Care System is developing the technology in partnership with the University of Maryland School of Medicine, the Johns Hopkins University Applied Physics Laboratory, Rice University, and the Walter Reed Army Medical Center.

The 2011 study explained how the research team used brain signals from electroencephalograms (EEG) to reconstruct the complex movements of the ankle, knee, and hip joints humans use to walk on treadmills. It indicated that brain waves captured by the cap can be used to study the dynamics of walking, and to develop brain-machine interfaces that can restore human gait function.

Two previous studies published within the past 18 months showed similar results for hand movements. The research showed that subjects wearing the "brain cap" could control a computer cursor with their thoughts.

In related work, VA researchers in Maryland have been developing a prosthetic device called an "anklebot," or ankle robot, which stores data from a normal human gait and assists partially paralyzed people. It provides a way to get stroke survivors up and moving, and it also can help to retrain healthy areas of the brain.

According to Richard Macko, MD, of the VA Maryland Health Care System, "Those centers of the brain that control walking may help a person actually move a robot, and perhaps improve their own capacity to walk without a robot. This may have a tremendous effect on their capacity to get around in their daily lives."

TRAUMATIC BRAIN INJURY

A traumatic brain injury, or TBI, is defined as a blow or jolt to the head or a penetrating head injury that disrupts the function of the brain. While not all blows or jolts to the head result in a TBI, the injury is one of the most common sustained by Service men and women who have served in Iraq and Afghanistan, especially as the result of exposure to blasts from improvised explosive devices.

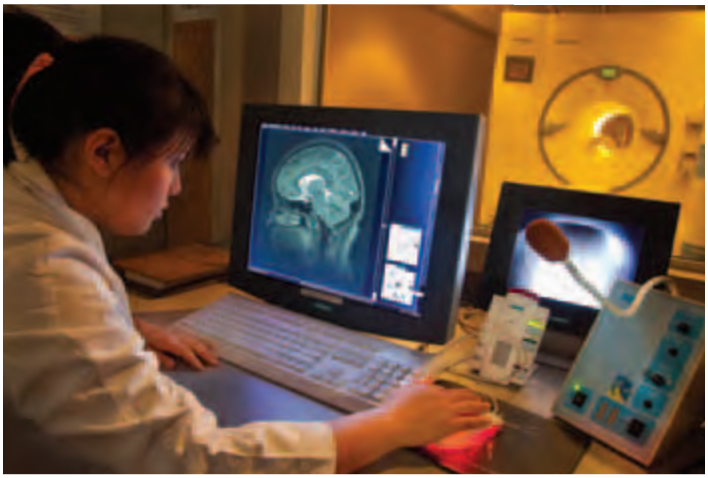
VA researchers are working to shed light on the changes to the brain caused by TBIs; improving screening methods and refining tools for diagnosing the condition; developing drugs to treat brain injuries or limit their severity when they first occur; designing improved methods to assess the effectiveness of treatment; helping Veterans with brain injuries to reintegrate into their communities; and learning the best ways to help family members cope and support their loved ones.

Dr. Scott Spoonheim (at the computer) inspects EEG recordings of brain waves from a Veteran. Laboratory assistant Peter Lynn monitors electrode placement.
PHOTO: APRIL EILERS

VA is creating a Traumatic Brain Injury Veterans Health Registry, which will provide military and civilian researchers with data on a large number of well-documented cases of TBI from the conflicts in Iraq and Afghanistan. This data resource will allow for comparisons of screening, diagnostic, and treatment options with the goal of improving outcomes for Veterans who have experienced this injury.

The registry will enable researchers to evaluate treatment outcomes to guide future research and policy development; compare symptoms, treatment, and outcomes of war-related TBI to TBI in civilian patients; and examine the association of TBI with other medical conditions, including PTSD, depression, memory loss, sensory loss, and seizure.

VA is also conducting a "New Generation Study" of recent Veterans—following and assessing 60,000 Veterans, half of whom were deployed to combat areas, for 10 years. A subset of that group will participate in the MIND Study, in which Veterans who have symptoms of TBI or PTSD and a comparison group of Veterans will receive further physical evaluation and diagnostic testing to build objective and consistent diagnostic criteria for both conditions.



Imaging technician Katherine Wu gets ready as a study participant prepares to undergo an MRI scan at the San Francisco VA Medical Center.
PHOTO: ROY KALTSCHMIDT

A study led by Glenn Cockerham, MD, of the Palo Alto VA, found that of 46 combat Veteran patients who had developed TBIs from documented blast injuries and had not previously reported any injury to their eyes, 20 (43 percent) suffered what ophthalmologists called "closed-eye ocular injuries"—injuries that do not actually penetrate the eye. The study team recommended that all Veterans with a TBI diagnosis have a comprehensive eye examination to check for hidden eye injuries that may cause future problems.

LEVERAGING RESEARCH ON SPORTS INJURIES TO BENEFIT VETERANS

Mingxiong Huang, PhD (left), and Roland Lee, MD, study an image from a MEG scan of the brain. The technology captures electromagnetic signals from brain cells and may be able to show subtle abnormalities missed by other diagnostic methods.
PHOTO: KEVIN WALSH

The circumstances behind traumatic brain injuries in athletes and combat troops may be light years apart, but some of the biological effects may be the same. Understanding this, the National Football League has provided a $100,000 grant to two VA researchers, to help develop a better understanding of the injury in both populations.

The researchers, physicist Mingxiong Huang, PhD, and neuroradiologist Roland Lee, MD, have been using two types of brain scans—magnetoencephalography (MEG) and diffusion tensor imaging (DTI)—to find subtle brain injuries in service members and Veterans that go undetected in conventional brain scans. According to Huang, a researcher at the VA San Diego Healthcare System, injured brains generate pathological low-frequency brain waves like those seen in normal patients during deep, dreamless sleep. He believes that damaged neurons may become like frayed wires, unable to conduct impulses effectively.

The NFL grant will allow the team to look at high school and college football players, as well as students involved in other contact sports. One of the objectives is to develop a reliable test to be used after trauma to determine whether brain function is normal. Huang and Lee believe such a test will be especially useful in cases where athletes who have sustained head injuries deny being hurt because they want to keep playing—or Service members who have been hurt want to continue doing their jobs. Said Lee, "You can't fake the results when your brain waves are measured."

VA HEALTH CARE SYSTEM

VA is considered a national leader in health services research—looking at how care is delivered, and identifying ways to innovate and improve.

One key topic in this arena of VA research is electronic medical records. VA clinicians began using computerized patient records in the mid-1990s for everything from recording doctors' exam notes and tracking prescriptions to displaying the results of lab tests and X-rays. Today, VA has one of the world's most comprehensive and sophisticated electronic systems for patient records, and VA researchers are continually seeking further enhancements.

In a study at six VA medical centers, the results of which were published in 2011 in the *Journal of the American Medical Association*, researchers used Google-like technology called "natural language processing" (NLP) to interpret free text in Veterans' electronic medical records, such as doctors' notes, and identify post-surgery complications.

Compared with a standard automated method that scans administrative data, NLP was better at picking up adverse post-surgery events such as lung, kidney, or heart problems. To provide a benchmark for both approaches, trained nurses manually reviewed the patient records and carefully looked for any clinical notes indicating complications.

Another recent study related to VA's electronic health record system found that nearly 80 percent of VA patients responding to a survey would like to share their electronic health information with family members, caregivers, and outside providers. VA's Blue Button Initiative, available to enrolled Veterans on the Departments MyHealtheVet Web site,

Dr. Peter Letarte, chief of neurological surgery at the Hines VA Medical Center, reviews a patient's electronic medical record. PHOTO: JERRY DALIEGE

now allows Veterans to download their personal health information into a simple text or PDF file that can be read, printed, or saved on any computer and shared with their health care providers, caregivers, or others they trust.

Also in 2011, a team from the Boston VA Healthcare System and Stanford University published an important article about a new approach to clinical trials that experts say will cost less to implement and yield results that will be more easily translated into patient care. The team is conducting a "point of care" study that will involve more than 3,000 Veterans with diabetes. The trial compares two treatments, as do many standard randomized clinical trials, but is innovative because it embeds research into routine clinical care. It compares treatments that doctors are already using, and collects data on which treatments work best within the context of real-world, everyday practice.

VA Research expects the forward-looking "point of care" approach to clinical trials to become more widely used in the coming years.

THE UPS AND DOWNS OF BLOOD PRESSURE MEASUREMENT

PHOTO: BANANASTOCK/THINKSTOCK

You've just been to the doctor and your blood pressure is a bit high. Or is it? A 2011 study at the Durham VA Medical Center and Duke University confirmed that people's blood pressure tends to be higher at the doctor's office than when they check it themselves at home. Learn more in VA Research Currents at

www.research.va.gov/currents/jul-aug11/jul-aug11-01.cfm.

COMPUTER-BASED LEARNING BOOSTS ONCOLOGISTS' COMMUNICATION SKILLS

Empathy is an important aspect of interactions between oncologists and their patients.

Showing doctors recordings of their interactions with patients may improve their ability to show empathy and communicate effectively, according to a study by VA researchers and university partners. The findings appeared in the Nov. 1, 2011, *Annals of Internal Medicine*.

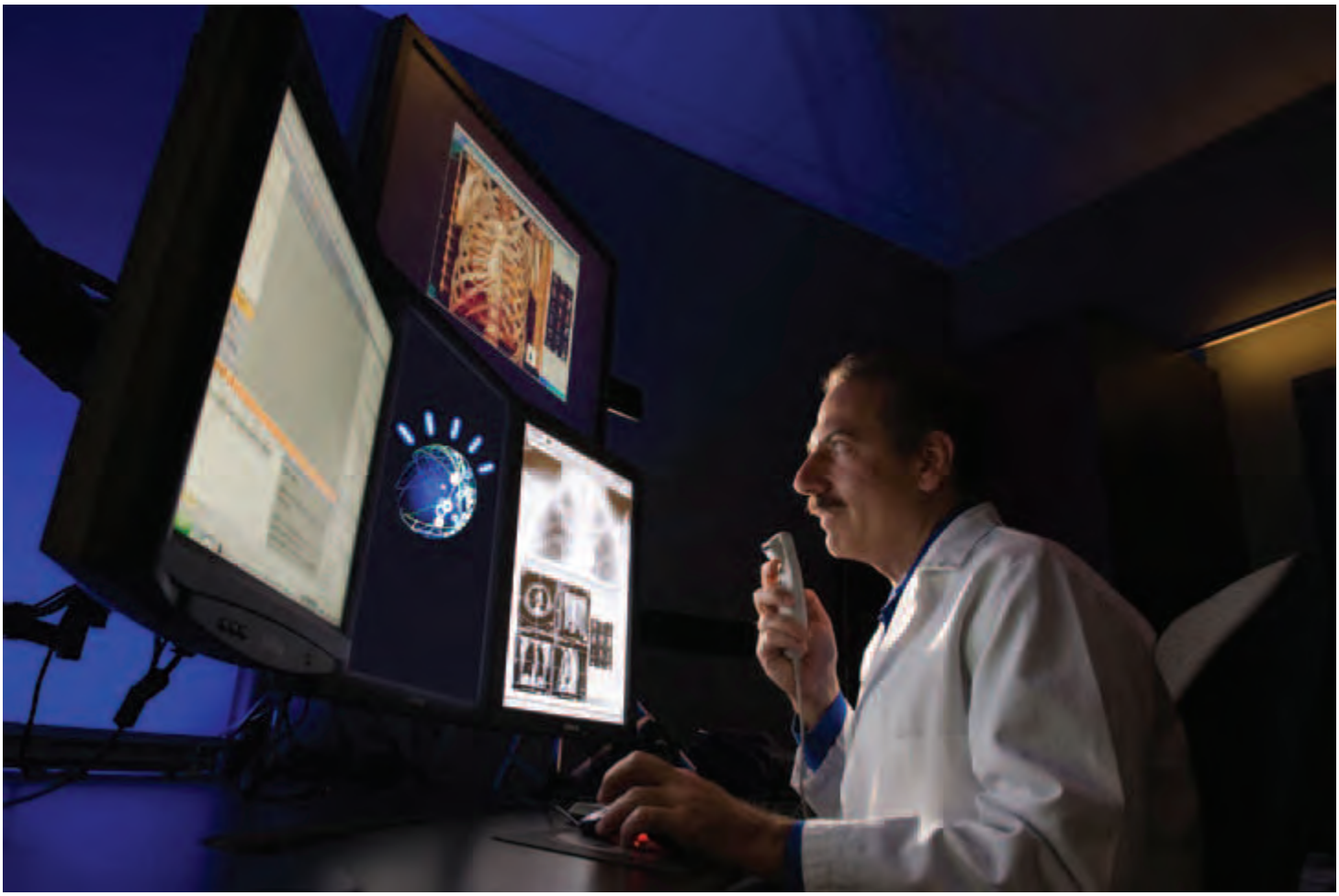
"VA's advancements in medical research lead to better care for Veterans," said Secretary of Veterans Affairs Eric K. Shinseki. "VA is always striving to improve the care we provide Veterans."

The research team audio-recorded four to eight visits between the doctors and their patients with advanced cancer. All the doctors then attended an hour-long lecture and discussion on effective communications skills. Afterwards, half were randomly assigned to receive a CD-ROM communications skills tutorial, along with personalized feedback and video clips to watch; the other half received no additional information. The CD taught the doctors how to recognize and respond to opportunities in conversations when patients share negative emotions, and how to empathetically discuss their prognosis.

Subsequently, all oncologists were again recorded during patient visits, and the recordings were assessed by both patients and trained listeners. Oncologists who did not take the CD course made no improvement in the way they responded. Doctors in the CD-trained group responded empathically to patients' concerns or fears twice as often as those who received no training. Also, patients of the intervention group reported greater trust in their doctors—a key component of care that enhances quality of life.

Nearly 50 VA and non-VA doctors took part in the study. The results were evaluated by a team with the Durham and Pittsburgh VA Medical Centers, Duke University, the University of Texas, and the University of Pittsburgh. The work was funded by the National Cancer Institute.

"This simple technology can improve oncologists' empathic behavior and, consequently, patient trust, leading to improved adherence to therapy," wrote the authors, led by James A. Tulsky, MD, of Duke University and the Durham VA Medical Center. They recommended that future research evaluate the effect of such an approach on both oncologists and patients over time.



Radiologist and informatics expert Dr. Eliot Siegel is leading an effort to explore how IBM's Watson computer system can aid clinical decision-making.
PHOTO: UNIVERSITY OF MARYLAND.

DR. WATSON, I PRESUME?

In February 2011, IBM's Watson supercomputer (named after the company's first president, Thomas J. Watson) defeated two past champion human contestants on the TV Game show *Jeopardy*. Now, VA and academic researchers are testing the computer's ability to analyze medical information and help doctors provide good care.

Actually, Watson is not a piece of hardware but an application—what IBM calls a "deep question and answer" program. It runs on more than 90 servers and performs some 80 trillion operations per second. When asked a question, Watson recognizes "natural language"—plain English—and uses Google-like technology to fetch possible answers. Then it uses thousands of algorithms programmed in by IBM engineers to rank the answers and give the best one.

For the game show, Watson was fed some 200 million pages of data on topics ranging from history and science to art and pop culture. These days, instead of digesting data on everything from movie stars to motorcycles, Watson is focused on medicine. A study at Columbia University and the University of Maryland School of Medicine, also involving a team at the Baltimore VA Medical Center, is enrolling Watson in medical school. Medical journals and textbooks will be its staple diet, and informal information, such as health blogs, may also be part of the mix.

The idea is not to replace doctors and their human skill and discretion, but to give them a quick and super-powerful information tool. Taking advantage of voice-recognition technology—and cloud computing to connect to Watson's servers—doctors could conceivably talk into a hand-held device and get real-time advice from Watson to help manage patients.

Merging Watson's super analytical ability with VA's richly detailed electronic medical record system could spell a huge leap forward in clinical decision-making. Eliot Sigel, MD, chief of imaging of the VA Maryland Health Care System, is leading the project for VA and the University of Maryland. He believes that Watson could result in "a renaissance in the application of artificial intelligence" in medicine.

WOMEN VETERANS

Today, there are more than 1.8 million women Veterans, and they account for an increasingly significant percentage of the total population of Veterans in the United States. For at least the past decade, VA has made women Veterans' gender-specific health care needs a major priority. In addition to examining how best to deliver care to women and eliminate any barriers, VA researchers are looking at a broad range of health conditions as they affect women Veterans, including breast and reproductive cancers; posttraumatic stress disorder, depression, and other mental health problems; and chronic illnesses such as arthritis, diabetes, and heart disease. All in all, VA research on women's health issues has improved the Department's ability to care for women Veterans of all eras.

A recent systematic review by the Evidence-based Synthesis Program Center at the Greater Los Angeles VA Medical Center assessed the state of women Veterans' health research. The review showed that women are among the fastest-growing groups of new users in the VA health care system, with particularly high rates of utilization among Iraq and Afghanistan Veterans. Of the more than 100,000 women Veterans of those conflicts, more than 44 percent have enrolled for VA health care.

The review also demonstrated that more research on the health of women Veterans was published between 2004 and 2008 than in the previous 25 years combined. This is attributed, in part, to VA's initiation of a comprehensive research agenda on women's health in 2004. VA also formed the Women's Health Practice-Based Research Network to help recruit more women Veterans into VA studies and foster the design and testing of interventions focused on their health problems.

In a July 2011 supplement devoted to women Veterans in the journal *Women's Health Issues*, a Greater Los Angeles research team reported on focus groups they held with 29 homeless women Veterans. According to the study, women Veterans are up to four times more likely to be homeless than non-Veteran women.

Women are being exposed to combat more frequently than ever.

From the focus groups, the team found five different types of precipitating experiences that led women Veterans down the path of homelessness: childhood adversity; trauma or substance abuse during military service; post-military abuse, adversity, or relationship termination; post-military mental health, substance abuse, or medical problems; and unemployment. The team concluded that there are multiple points along the path to homelessness for women Veterans where VA and community-based organizations can intervene to halt the process.

RESEARCH EXAMINES GENDER DIFFERENCES IN RESPONSE TO WARTIME STRESSORS

More than 44 percent of Women Veterans of Iraq and Afghanistan have enrolled for VA health care.

As a consequence of women's changing role in the war zone and the evolving nature of modern warfare, female Service members have experienced unprecedented levels of combat exposure in Afghanistan and Iraq, although women are still barred from direct ground combat positions.

A recent VA study found that women do not experience higher rates of post-combat psychiatric problems than men—calling into question the notion that women may be more vulnerable than men to the negative effects of combat.

The study, which appeared in the *Journal of Abnormal Psychology*, was led by Dawn Vogt, PhD, of VA's National Center for Posttraumatic Stress Disorder (PTSD). Investigators analyzed 592 completed self-report surveys (340 women and 252 men) and used a wide variety of survey measures covering combat experience (such as being fired upon or witnessing injury or death), the aftermath of battle (observing or handling human remains or dealing with detainees), and prior stress exposure.

Women reported slightly less exposure to most combat-related stressors than did men, but they reported higher exposure to other stressors, such as prior life stress and sexual harassment while deployed.

The study identified essentially equal levels of PTSD and depression among men and women in the first year following deployment; however, male service members showed slightly higher rates of post-deployment substance abuse.

In an *Army Times* interview, Vogt suggested that combat stress is far more intense than other forms of stress, which may flatten out gender differences. "It may be that combat involves such a high level of stress that it overwhelms any differences we see in men and women," she said.

Vogt and her co-authors suggested that additional research is needed to evaluate gender differences in the longer-term effects of combat deployment.

VA RESEARCHERS IN THE NEWS

During 2011, many VA researchers and their studies were highlighted in the popular press and in national broadcast media. Following is a brief sampling of the coverage.

PAUL MARASCO, PHD, a bioengineer at VA's Cleveland-based Advanced Platform Technology Center, described his team's work on "targeted reinnervation" in a Feb. 26 article in *Science News*. The surgical technique, performed in patients with upper limb amputations, involves rerouting nerves so as to provide a more natural sensation for artificial limbs.

THOMAS HOUSTON, MD, of the Bedford (Mass.) VA Medical Center was featured in a March 21 *Boston Globe* article about his study on storytelling as an effective tool to help African Americans manage high blood pressure. Houston told the *Globe*: "Stories from 'real' people [in this case, neighbors of patients] just have more credibility than statistics. When provided with facts, people often counter-argue or identify ways that the information is not directly related to them. With storytelling, you get engaged in the story, you hear the information and counter-arguing mechanisms of your brain are turned off." He said the approach may be especially useful for patients who tend to not trust information they receive from medical professionals.

PHOTO: JUPITER IMAGES

MATTHEW MACIEJEWSKI, PHD, an investigator with the Center for Health Services Research in Primary Care at the Durham VA Medical Center, was quoted in a June 13 *Reuters Health* piece about his group's study on bariatric surgery. The study found that weight-loss surgery may not help obese middle-aged and older men live longer. Maciejewski said doctors should be extra careful when counseling obese patients about their options.

ANN MCKEE, MD, a neurologist and neuropathologist with the VA New England Healthcare System and one of the nation's leading experts on concussions, was quoted in a July 1 *CNN.com* review of "Bell Rung," a documentary about head injuries among football players. McKee oversees several brain banks based at the Bedford (Mass.) VA Medical Center and is an investigator with VA's recently established Translational Research Center for Traumatic Brain Injury and Stress Disorders.

Ann McKee, MD, seen here with medical students at one of the brain banks she oversees at the Bedford (Mass.) VA Medical Center.
PHOTO: FRANK CURRAN

JULIA NEILY, RN, MS, MPH, associate director of VA's National Center for Patient Safety, was quoted in a July 18 *Associated Press* piece on her group's study showing sharply reduced rates of wrong-site surgeries within the VA health care system, thanks to an ongoing quality-improvement program. Said Neily, "Care is becoming safer."

KRISTINE YAFFE, MD, chief of geriatric psychiatry and director of the Memory Disorders Program at the San Francisco VA Medical Center, was quoted by *USA Today* on July 18 in connection with her study suggesting an increased risk of dementia in later life among those with traumatic brain injuries. "We are now getting a much better understanding that head injury is an important risk factor for developing dementia down the road," said Yaffe.

Dr. Kristine Yaffe
PHOTO BY: CODY PICKENS

JEFFREY PYNE, MD, an investigator with the Center for Mental Healthcare and Outcomes Research at the Little Rock VA Medical Center, was quoted in an Aug. 1 *Military Times* piece titled "Too Tough to Die? Purple Heart Recipients Live Longer, Study Says." The article discussed research by Pyne's group showing that older Veterans who had survived combat wounds during their military service—and received a Purple Heart as a result—appeared to die at a slower rate than similar-aged Veterans who had not been wounded and awarded a Purple Heart. Said Pyne, "We're all in search of what it is that makes a soldier resilient to stress, and this study many identify a way we can identify Veterans who fall into this category."

JOHN KRYSTAL, MD, director of the clinical neurosciences division of VA's National Center for Posttraumatic Stress Disorder, was featured in an Aug. 3 *New York Times* article about a study his group conducted on the use of the antipsychotic drug risperidone to treat PTSD, for patients who had not responded adequately to other treatments. The multisite study, sponsored by VA's Cooperative Studies Program, found little benefit from the drug among the study population. "We didn't find any suggestion that the drug treatment was having an overall benefit on their lives," Krystal told the Times.

MICHAEL STEINMAN, MD, a geriatrics researcher at the San Francisco VA Medical Center, was quoted in a Sept. 12 Associated Press article about a VA study dealing with consumers' mistaken perception that newer prescription drugs are always safer and more effective than older ones. Steinman, who had written a journal commentary accompanying the research article, told AP, "One of the reasons doctors tend to prescribe newer, expensive drugs is there's a widespread perception that newer is better. That's sometimes true, but many times it's not true. So much of what doctors learn about new drugs is somehow affected by drug company marketing."

SUZANNE CRAFT, PHD, of the Geriatric Research, Education and Clinical Center at the VA Puget Sound Healthcare System was interviewed for the Sept. 12 edition of *PBS NewsHour*. The topic was Craft's study on the potential benefits of a nasal insulin spray to prevent or treat Alzheimer's disease.

STEVEN WOLOSHIN, MD, MS, co-director of the VA Outcomes Group at the White River Junction (Vt.) VA Medical Center, was featured in an Oct. 4 *New York Times* report on the problem of "overtreatment" and unnecessary testing in U.S. health care. Woloshin said, "A patient should ask, Why do I need this test? What do I get out of it? What's my chance of something bad happening if I don't get the test, or if I do get the test?"

MATTHEW FRIEDMAN, MD, PHD, executive director of the National Center for Posttraumatic Stress Disorder, was the subject of a Nov. 8 *Washington Post* piece titled "PTSD Expert Helps 'Pick Up the Pieces' of Shattered Lives," contributed by the Partnership for Public Service on the occasion of Friedman's Service to America award. According to the write-up, "Friedman established and runs the world's pre-eminent post-traumatic stress disorder research and educational center. A pioneer in the field of traumatic studies, Friedman has devoted his career to identifying the causes and treatments of PTSD and advocating for those whose psychological well-being has been harmed by the stresses of war and other experiences."

JOEL KUPERSMITH, MD, chief research and development officer for VA, was quoted in a National Public Radio "Morning Edition" report on Nov. 14 concerning the Million Veteran Program. The genomics project aims to build one of the world's largest databases of genetic, military exposure, lifestyle, and health information. (Visit www.research.va.gov/mvp for more information.)

SHIRA MAGUEN, PHD, a psychologist and PTSD researcher at the San Francisco VA Medical Center, was quoted in a Nov. 25 *USA Today* report about the Marine Resilience Study, a collaborative effort between VA and the Department of Defense. The article focused on "moral injury" as a possible contributing cause of PTSD. Maguen, who has studied the psychological impact of killing among combat troops, said, "This study is important because so little has been done to understand moral injury in a scientific context."

AWARDS

During 2011, numerous VA researchers were recognized for their scientific accomplishments, as well as their service as mentors, teachers, and leaders. Here is a summary of just some of these honors.

Middleton Award

The Middleton Award is the highest honor given by VA's Biomedical Laboratory Research and Development Service. It was established in 1960 to honor William S. Middleton, MD, a distinguished educator and physician-scientist who was VA's chief medical director from 1955 through 1963. In 2011, the award was given to two VA researchers:

JEROME SIEGEL, PHD, a VA researcher since 1976, today is chief of neurobiology research at the Greater Los Angeles VA Healthcare System and a professor of psychiatry at the University of California, Los Angeles. His research has focused on understanding sleep disorders, including sleep apnea and narcolepsy. His laboratory has made major advances in understanding the causes of sleep apnea, which affects more than four percent of the population and, left untreated, causes brain damage, cardiovascular disorders, and a shorter lifespan. In 2000, Siegel's group, working in parallel with a group from Stanford University, discovered that the cause of narcolepsy (a sleep disorder characterized by sudden and uncontrollable episodes of deep sleep) was a loss of brain cells containing the peptide hypocretin (also called orexin). In 2007, Siegel's group found that these cells were also lost in Parkinson's disease, likely causing the sleep attacks that are among the most disabling aspects of this disorder. The team has also shown that hypocretin replacement can reverse the symptoms of narcolepsy, which may also benefit Parkinson's disease patients and those with depression.

Dr. Jerome Siegel

J. BRICE WEINBERG, MD, is a staff physician in hematology-oncology at the Durham VA Medical Center and a professor of medicine and immunology at Duke University. He received the Middleton Award for studies on monocytes and macrophages (white blood cells that are part of the immune system) and leukemia cell biology, with a focus on nitric oxide. Nitric oxide is an important cellular messenger involved in many physiological and pathological processes, and Weinberg's research has yielded a better understanding of these pathways. Weinberg, an Air Force Veteran, has been with VA and Duke since 1978. In 2008, he received a Lifetime Achievement Award for Outstanding Research on Nitric Oxide and Cancer from the National Cancer Institute. He was named one of the "top ten" in federal medicine by U.S. Medicine in 2003; and received seven Physician's Recognition Awards from the American Medical Association, and two Excellence in Teaching awards from Duke University.

Dr. J. Brice Weinberg

Teague Award

The Teague award is named after Olin E. Teague, a disabled Veteran of World War II who championed Veterans' programs during his long Congressional career, in which he served as chairman of the House Committee on Veterans' Affairs. The award recognizes VA employees whose achievements have been extraordinarily beneficial to the rehabilitation of war-injured Veterans.

PETER TUERK, PHD, is clinical psychologist at the Ralph H. Johnson VA Medical Center in Charleston, S.C., and an investigator with VA's Center for Disease Prevention and Health Interventions for Diverse Populations. Tuerk has played a key role in helping train VA mental health staff nationwide in prolonged exposure therapy. His VA clinic was the first to provide the therapy via videoteleconferencing. This evidence-based treatment for posttraumatic stress disorder has significantly improved outcomes for Veterans suffering from the illness. Tuerk is an assistant professor at the Medical University of South Carolina and director of research training for the MUSC/VA psychology internship program consortium. In 2011, he helped Japanese authorities train mental health personnel in the wake of the disastrous earthquakes and tsunami in that nation.

Dr. Peter Tuerk

Magnuson Award

The Paul B. Magnuson Award is presented annually to a VA rehabilitation investigator who exemplifies the entrepreneurship, humanitarianism, and dedication to Veterans that was embodied by its namesake, a bone and joint surgeon and VA's chief medical director in the years after World War II.

RICHARD F. MACKO, MD, serves as associate director of research for VA's Geriatric Research Education and Clinical Center in Baltimore. He is also director of the Baltimore VA's Center of Excellence in Exercise and Robotics. Macko, a neurologist, studies the effects of aerobic exercise on patients who have had strokes. His research has shown that exercise can improve fitness, metabolism, insulin and blood sugar levels, and walking ability in stroke survivors—even decades after the stroke occurred. In particular, his group has shown that neuroplasticity—the ability of the brain to rewire itself to perform new tasks—can be leveraged through task-repetitive activities such as walking on a treadmill. Some participants in exercise programs have regained up to 40 percent of their lost mobility. Macko is also the academic director of the University of Maryland's Rehabilitation Medicine Division.

Dr. Richard F. Macko

Under Secretary's Award for Outstanding Achievement in Health Services Research

The Under Secretary's Award for Outstanding Achievement in Health Services Research is the highest honor a VA health services researcher can receive.

PAUL G. SHEKELLE, MD, MPH, PHD, is chief of general internal medicine at the Greater Los Angeles VA Healthcare System and leads that site's Evidence Synthesis Program, a program of VA's Health Services Research and Development Service. Shekelle is also a professor of medicine in residence at the David Geffen School of Medicine of the University of California, Los Angeles; director of the Southern California Evidence-based Practice Center; and director of the Quality Assessment Improvement Program at RAND. He also chairs the American College of Physicians' Clinical Guidelines Committee, and co-chairs the National Guideline Clearinghouse Editorial Board.

Dr. Paul G. Shekelle

Shekelle has spearheaded the development of new ways to assess the quality of health care, particularly for older adults. Five quality indicators he developed are now part of VA's benchmarking sets. He also led an international group that has provided guidance to the Institute of Medicine on developing quality of care guidelines.

Shekelle was also cited for his mentorship of early-career health services researchers, and for his role in raising the visibility of VA research through his leadership in national research and medical organizations.

Other national awards for VA researchers

DANIEL ANAYA, MD, a surgical oncologist and cancer researcher with the Michael E. DeBakey VA Medical Center in Houston, received a 2011 Career Development Award from the Conquer Cancer Foundation, a program of the American Society of Clinical Oncology. The award will support his research on using comprehensive testing to assess the baseline health of older patients with colorectal cancer and predict how surgery and other treatments will impact their quality of life. Anaya is a research scientist at VA's Health Services Research and Development Center of Excellence in Houston and directs the Liver Tumor Program at the site.

Dr. Daniel Anaya

MICHAEL WEINER, MD, director of VA's Center for Imaging of Neurodegenerative Diseases and a professor at the University of California, San Francisco, accepted the Ronald and Nancy Reagan Research Award from the Alzheimer's Association in April 2011 on behalf of the nationwide Alzheimer's Disease Neuroimaging Initiative, which Weiner leads. The $140-million, 10-year clinical trial will involve more than 1,000 patients at 55 centers in the United States and Canada. Supported by a consortium that includes the National Institutes of Health, private industry, and the Canadian government, the project is designed to validate biomarkers for detecting and monitoring the progression of Alzheimer's disease.

Dr. Michael Weiner

KATHRYN MAGRUDER, PHD, MPH, an epidemiologist at the Charleston (S.C.) VA Medical Center, received a Fulbright scholarship to spend the academic year in Turkey as a visiting scholar. She has been studying PTSD among civilians, including displaced Iraqis and possibly Syrian refugees. In addition to conducting new research, Magruder is also giving lectures and conducting seminars on her work with U.S. Veterans. With the help of Skype and other technology, she is continuing her role in current VA studies such as two long-term studies on Vietnam Veterans, and a study comparing Web-based training with in-person training for suicide prevention staff.

Dr. Kathryn Magruder

ROBERT HENRY, MD, chief of diabetes, endocrinology, and metabolism and director of the Center for Metabolic Research at the VA San Diego Healthcare System, received the 2011 Banting Medal for Service from the American Diabetes Association (ADA). A leading expert on insulin resistance, Henry has received more than 80 grants and awards for diabetes research over the past 25 years, including the ADA's Distinguished Clinical Scientist Award. His most recent studies investigate the metabolic and cardiovascular effects of newer therapies for insulin resistance and diabetes.

Dr. Robert Henry

MICHAEL FINE, MD, MSC, received the 2011 John M. Eisenberg Award for Career Achievement in Research from the Society of General Internal Medicine (SGIM). The award recognizes the career achievement of a senior SGIM member whose research has changed the way generalists care for patients, conduct research, or educate students. Fine directs VA's Center for Health Equity Research and Promotion (CHERP) and is a professor at the University of Pittsburgh. His research over the past quarter-century has helped change how internists and pulmonary and infectious-disease specialists manage pneumonia. It has also helped shape national and international guidelines and quality standards. In the area of health disparities, Fine is credited with developing a conceptual framework that guides much of the work in this area by VA and other researchers. As a mentor, Fine has leveraged CHERP's impact to help launch the research careers of more than 50 trainees in academic medicine.

Dr. Michael Fine

REHABILITATION SCIENTIST HONORED FOR MENTORING

Dr. Rory Cooper in his laboratory.

Rory Cooper, PhD, director of the Human Engineering Research Laboratories, a collaboration between VA and the University of Pittsburgh, received the 2011 Mentor Award from the American Association for the Advancement of Science "for his dedication and successful efforts to increase the number of women and persons with disabilities with doctoral degrees in rehabilitation science." Cooper, a U.S. Army Veteran who sustained a spinal cord injury, has mentored well over 200 undergraduate and postgraduate students, many of them with disabilities and many from groups who are underrepresented in science, technology, engineering, and mathematics. Cooper has received numerous other awards for his research, academic leadership, and community service, including the Distinguished Public Service Award from the Department of the Army. He has conducted innovative research at the National Veterans Wheelchair Games and is an accomplished wheelchair athlete himself.

PRESIDENTIAL AWARDS FOR EARLY-CAREER SCIENTISTS

Dr. Christine Freeman, one of four recent VA winners of the Presidential Early Career Award for Scientists and Engineers, studies chronic obstructive pulmonary disease at the VA Ann Arbor Medical Center.

Four VA researchers were among 94 recipients of the Presidential Early Career Award for Scientists and Engineers presented in October 2011 in a ceremony at the National Museum of Natural History in Washington, DC.

Joining fellow award recipients from other federal agencies were VA investigators Tanya Z. Fischer, MD, PhD, from West Haven; Christine M. Freeman, PhD, Ann Arbor; Kristina M. Utzschneider, MD, Seattle; and B. Price Kerfoot, MD, EdM, Boston.

Fischer was recognized for her research on chronic pain, including the sometimes debilitating pain suffered after burn injuries. Freeman's honor stemmed from the research she has conducted on chronic obstructive pulmonary disease, one of VA's most problematic chronic diseases. Utzschneider was honored for her work on type 2 diabetes and its link to obesity and liver disease—three disorders that are on the rise for Veterans and the U.S. population overall. Kerfoot was cited for his innovative work at the intersection of medical education and computer science. One example is the Computerized Adaptive Space Education technology he developed so learners can customize online information delivery.

Established by the Clinton administration in 1996, the PECASE honors are given each year for "innovative research at the frontiers of science and technology" and a commitment to community service.

DOCTORS WHO CONDUCT RESEARCH REPORT HIGHER JOB SATISFACTION

VA physicians who spend at least 20 percent of their time in research activities are more likely to have greater job satisfaction and report more favorable job characteristics, according to an article published in August 2011 in *Academic Medicine*. The study was titled "Job Characteristics and Job Satisfaction among Physicians Involved with Research in the Veterans Health Administration."

"Research and continuous learning are vital to improving the health and health care of Veterans," said Secretary of Veterans Affairs Eric K. Shinseki. "As this study shows, the outcome is not only in terms of scientific innovation and development on behalf of Veterans, but also in terms of the professional fulfillment our physicians experience."

Study authors David C. Mohr, PhD, and James F. Burgess Jr., PhD, of the VA Boston Health Care System, based their findings on data from the 2008 VA All Employee Survey, which included a question about research involvement. VA physicians with at least 20 percent research involvement provided higher ratings with regard to new skill development opportunities, work and family balance, feedback from supervisors, and job autonomy. Responses came from 7,734 full-time physicians at 135 VA medical centers nationwide.

VA Under Secretary for Health Robert A. Petzel, MD, said, "With physician job satisfaction vital to both workforce retention and better patient outcomes, the study holds important implications for maintaining a high performance health system."

Petzel, along with VA chief academic affiliations officer Malcolm Cox, MD; VA chief research and development officer Joel Kupersmith, MD, and VA principal deputy under secretary for health Robert L. Jesse, MD, PhD, co-authored a related commentary titled "Building Human Capital: Discovery, Learning and Professional Satisfaction."

Both the study and the commentary can be found at http://journals.lww.com/academicmedicine.

HISTORICAL ACCOMPLISHMENTS

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 systems."
- 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 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 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. In the program, based on earlier research by VA and university investigators, caregivers are provided individual and group counseling, a caregiver guide, education on safety and patient behavior management, and training for their individual health and well-being.
- 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.

2010

- As part of the VA Genomic Medicine Program, announced a groundbreaking genetics study—the Million Veteran Program—to study the effects genes have on health, with some one million Veterans expected to take part over the next five to seven years.
- Combined efforts with VA/ U.S. Army studied ways to prevent suicide among active-duty service members, Veterans, and reservists and to build on existing suicide research in VA, DoD, and the civilian sector; conducted research with U.S. Marines to determine why certain Service members develop PTSD while others do not.
- Began work on a computerized vision system to bridge limits of handheld GPS devices for blind users and offer additional mobility and independence for Veterans with vision loss.

PHOTO: STOCKBYTE

- Determined that Veterans with mental health conditions, especially PTSD, have more physical ailments, and that older veterans with chronic PTSD had a higher risk for dementia than their peers without the disorder.
- Found evidence that prior head injury may double the risk of developing amyotrophic lateral sclerosis (ALS), commonly known as Lou Gehrig's disease.
- Determined that robots can be used to provide repetitive, high-intensity therapy for stroke patients, confirming earlier findings that patients can recover function through therapy even years after a stroke.
- Found that the immune system is likely to have a role in the development of Parkinson's disease.
- Demonstrated a prototype of an artificial lens that could potentially restore natural focusing ability in eyes with cataracts and can be placed in the eye through a technique that is less invasive than current cataract surgery.
- Identified a potential biomarker for PTSD through the use of a super-fast scanner that captures cross talk between groups of neurons in the brain.
- Found that smoking cessation treatment that is made part of mental health care for Veterans with PTSD improves quit rates in those Veterans.

2009

- Showed that the traditional "on pump" method of heart bypass surgery yields better outcomes after one year than a newer method that does not use a heart-lung machine.
- Reported that deep brain simulation, though potentially riskier than drug therapy, may hold significant benefits for those with Parkinson's disease who no longer respond well to medication alone.
- Launched four-year study of long-term health and social outcomes of OEF/OIF Veterans with serious burn injuries.
- Began first-of-its kind study at VA medical centers to optimize the design of an advanced prosthetic arm, made by DEKA Research and Development through funding from the Defense Advanced Research Projects Agency.
- Commissioned studies by the Genetics and Public Policy Center at Johns Hopkins University that determined that most Veterans who have received health care through VA would support and participate in genomics research.
- Launched the "Consortium for Healthcare Informatics Research" and a related project, "Veterans' Informatics, Information, and Computing Infrastructure," to maximize the clinical and research value of VA's state-of-the art electronic medical records.
- Initiated the largest health study ever of Vietnam-era women Veterans, with up to 10,000 women expected to take part.
- Launched one of the largest studies to date on the genetics of schizophrenia and bipolar disorder, to involve 38,000 Veterans at more than 20 VA sites.
- Held symposium in Washington, DC, highlighting VA's 30-year track record in comparative effectiveness research.

2008

- Published results of one of the first randomized clinical trials comparing different treatment approaches for those with traumatic brain injury.
- Published the results of the landmark seven-year VA Diabetes Trial, which found that intensive control of blood glucose in type 2 diabetes does little to cut the risk of heart disease, compared with standard treatment.
- Sponsored an international conference on traumatic brain injury and expanded VA research in this area, including studies looking at TBI in association with posttraumatic stress disorder, hearing and vision loss, chronic pain, and other conditions.
- Demonstrated in a large multisite clinical trial that more intensive treatment for acute kidney injury—for example, dialysis six times instead of three times per week—may not produce any added benefit.
- Published a major review article on genomic medicine that found that on the whole, health professionals and the public are unprepared to make effective use of genomics to prevent, diagnose, or treat common chronic illnesses such as diabetes or heart disease. The findings are helping to guide further VA research in this area.
- Launched a nationwide expansion of an Alzheimer's-caregiver program that was commended by the Recognition of Excellence in Aging Research program of the U.S. Senate's Special Committee on Aging.
- Showed that flat lesions in the colon—considered until recently to be rare in the United States and generally ignored during colonoscopies—are more common than previously thought. Moreover, they are far more likely to be cancerous than polyps, the small raised knobs of tissue that often contain or signal cancer and are the main target for detection and removal during colonoscopies.
- Confirmed, in a treadmill study involving nearly 16,000 Veterans, the link between cardiovascular fitness and longer life. The study was the first of its kind to include a large number of African Americans, who are at higher risk for hypertension and other conditions that could conceivably offset the benefits of exercise.

- Enacted a new policy mandating the use of Cooperative Research and Development Agreements to facilitate and expand collaborations between VA researchers and private pharmaceutical and biomedical companies. The goal is to speed the development and implementation of effective new medical treatments for Veterans.

2007

- Established the Center of Excellence for Research on Returning War Veterans, based at the Central Texas Veterans Healthcare System, to augment research on brain injuries, PTSD, and other combat-related conditions.
- Unveiled the first powered ankle-foot prosthesis, developed in collaboration with researchers at MIT and Brown University.
- Found that prazosin, an inexpensive generic drug already used by millions of Americans for high blood pressure and prostate problems, could improve sleep and lessen trauma nightmares in Veterans with PTSD.
- Established a Pharmacogenomics Analysis Laboratory at the Little Rock VA to conduct diagnostic or treatment-related genetic tests for individual VA patients and to serve as a genetic research lab for VA's Cooperative Studies Program.
- Published the results of a major clinical trial, conducted with Canadian researchers, that found that balloon angioplasty and stenting did little to improve outcomes for patients with stable coronary artery disease who also received optimal drug therapy and underwent lifestyle changes.
- Demonstrated the benefits of prolonged-exposure therapy as a treatment for PTSD in a clinical trial that included 284 women.

2006

- Established the Center for Imaging of Neurodegenerative Diseases at the San Francisco VA, in collaboration with the Department of Defense.
- Published the results of a major study on dietary supplements for arthritis, in collaboration with the National Institutes of Health.
- Launched a Genomic Medicine initiative to advance knowledge of how genes affect health and to promote personalized medicine for Veterans.
- Reported major advances in the development of a brain-computer interface that will enable patients with spinal cord injury and other immobilizing conditions to function more independently.
- Launched a multisite trial to test robotic therapy for stroke rehabilitation.

2005

- Showed the effectiveness of a new vaccine for shingles, a painful skin and nerve infection that affects older adults.
- Announced major funding initiatives for research on neurotrauma, chronic pain, and other health problems prevalent in combat-wounded Veterans returning from Iraq and Afghanistan.

2004

- Showed that the antioxidant lutein could not only help prevent macular degeneration, but also reverse symptoms.
- Established a major center of excellence, in partnership with Brown University and MIT, to develop state-of-the-art prosthetics for Veteran amputees.
- Took on leadership of a five-year, $60-million study nationwide study—funded by the National Institute on Aging and other partners—to identify brain changes linked to Alzheimer's disease.

2003

- Created a national registry of Veterans with Lou Gehrig's disease (ALS) to track the health status of Veterans with the disease and help recruit research participants.
- Showed that a costly new schizophrenia drug may be no more effective than older, less expensive treatments.
- Launched the largest-ever clinical trial of psychotherapy to treat posttraumatic stress disorder.

2002

- Published, together with National Institutes of Health colleagues, the main results from the landmark ALLHAT study, the largest hypertension study ever, which found that conventional diuretics were better than newer medicines for treating high blood pressure.
- Developed, in partnership with U.S. Army and university researchers, an oral drug that promises to halt the deadly action of smallpox.
- Produced key clinical findings on ghrelin, a recently discovered "hunger hormone."
- Found that patients with osteoarthritis of the knee who underwent mock arthroscopic surgery were as likely to report pain relief as those who received the real operation, challenging the usefulness of a common medical procedure on which Americans spend more than $3 billion each year.

2001

- Began the first clinical trial under the Tri-National Research Initiative, with researchers from VA collaborating with colleagues from Canada and the United Kingdom to determine the optimal antiretroviral therapy for HIV.
- Initiated a landmark clinical trial to assess the effectiveness of deep brain stimulators for Parkinson's disease.

2000

- Showed that colonoscopy is superior to the more widely used sigmoidoscopy as a primary screening mechanism for colon cancer.
- Conducted the first large clinical trials of hearing aids, documenting that the devices can help the hearing-impaired in both quiet and noisy environments.

1999

- Found that a chemical messenger and a neurotoxin can shut down neurons associated with chronic pain while leaving intact those needed for a normal pain response.
- Launched the first treatment trials for Gulf War Veterans' Illnesses, focusing on antibiotics and exercise.
- Established, through a large clinical trial using the drug gemfibrozil, that raising HDL ("good") cholesterol and lowering triglycerides could prevent heart attacks and coronary deaths.

1998

- Nobel Prize awarded to VA researcher Dr. Ferid Murad for his discoveries relating to nitric oxide, a body chemical that helps maintain healthy blood vessels.
- Identified a gene that causes a rare form of dementia, providing a potential target for treatment of Alzheimer's disease.
- Found that less expensive, conservative treatment of a common type of heart attack is superior to the standard heart catheterization and balloon angioplasty.
- Demonstrated that administering erythropoietin under the skin is as effective and less expensive than intravenous administration for treatment of severe anemia in hemodialysis patients.
- Started the Quality Enhancement Research Initiative to help translate research results into clinical practice for conditions prevalent among Veterans.

1997

- Identified a gene associated with a major risk for schizophrenia.

1996

- Identified the gene that causes Werner's syndrome, a disease marked by premature aging.
- Developed clinical practice guidelines on cholesterol screening for the American College of Physicians.
- Found that an implantable insulin pump offers better blood sugar control, weight control, and quality of life for adult-onset diabetes than multiple daily injections.

1995

- Conducted the National Surgical Quality Improvement Program, which is instrumental in identifying ways to improve surgical care.

1994

- Demonstrated that one aspirin tablet a day reduced by half the rate of death and nonfatal heart attacks in patients with unstable angina.

1993

- Developed and tested a new device that has led to improved wheelchair designs by enhancing assessments of upper extremity pain in manual wheelchair users.

1991

- Developed Functional Electrical Stimulation (FES) systems that allow patients to move paralyzed limbs.
- Demonstrated that early treatment with corticosteroids reduces damage from spinal cord injury.

1990

- Contributed to the development of the first standards for wheelchair prescriptions.

1989

- Invented a computer system that provides patients on ventilators with more accurate respirator settings, fewer medical complications, and better outcomes.

1984

- Developed the nicotine patch and other therapies to help smokers give up the habit.

1977

- Nobel Prize awarded to VA researchers Dr. Andrew Schally, for his research on peptide hormone production in the brain; and Dr. Rosalyn Yalow, for her development of radioimmunoassay to detect and measure various substances in the blood.

1970

- Expanded understanding of how brain hormones interact with the endocrine system.
- Published the results of a landmark VA Cooperative Study on hypertension, showing that drug treatment was effective in controlling blood pressure and reducing the incidence of major cardiovascular events.

1968

- Performed the first successful liver transplants and developed techniques for suppressing the body's natural attempt to reject transplanted tissue.

1961

- Conducted groundbreaking work with radioisotopes that led to the development of modern radioimmunoassay diagnostic techniques.

1960

- Pioneered the concepts that led to development of computerized axial tomography (CAT scan).

1958

- Invented the implantable cardiac pacemaker, helping many patients prevent potentially life-threatening complications from irregular heartbeats.

1947

- Introduced the first mobility and orientation rehabilitation-training program for blind persons.

1946

- Developed and tested effective therapies for tuberculosis following World War II. Multi-center clinical trials led to development of the Cooperative Studies Program, which has since produced effective treatments for diseases and conditions including schizophrenia, diabetes, depression, heart disease, and stroke.
- Established the standard for developing better-fitting, lighter artificial limbs through studies of human locomotion, enhanced surgical techniques and modernized design and manufacturing methods.

1941

- Established a research lab at the Northport (N.Y.) VA medical center to conduct clinical and biomedical research in neuropsychiatric disorders; contribute to the nationwide standardization of diagnostic and treatment methods; and teach the latest concepts and methods in neurology, psychiatry, and neuropathology to VA doctors.

1935

- Published a series of articles in the *New England Journal of Medicine* about heart disease among Veterans.

1932

- Published data comparing outcomes at VA clinics with those at other hospitals. The VA facilities compared favorably. Also, established the Tumor Research Laboratory at the Hines (Ill.) VA—the first research lab to receive funds from VA Central Office specifically for research.

1928

- Reported findings from early VA studies looking at treatments for malaria, the long-term health effects of chemical warfare, and hospitalization and mortality among Veterans with mental illness.

1925

- Conducted the first hospital-based medical studies to be formally considered part of VA's newly established research program. Began publishing the *U.S. Veterans' Bureau Medical Bulletin*, designed, in part, to "promote research along practical lines."

PROGRAM OVERVIEW

Since 1925, the VA research program has been improving the lives of Veterans and all Americans through health care discovery and innovation. The VA Research program is unique because of its focus on medical issues that affect Veterans. It is part of an integrated health care system with a state-of-the-art electronic health record and has come to be viewed as a model for superior bench-to-bedside research. The groundbreaking achievements of VA investigators—most of whom also provide direct patient care—have resulted in three Nobel prizes, six Lasker awards, and numerous other distinctions. While realizing the advantages of an intramural program and embracing its close ties to academic affiliates, the VA Research program fosters dynamic collaborations with other federal agencies, nonprofit organizations, and private industry—thus furthering the program's impact on the health of Veterans and the Nation.

PHOTO: HEMERA TECHNOLOGIES

BIOMEDICAL LABORATORY *RESEARCH AND DEVELOPMENT*

This division conducts preclinical research to understand life processes from the molecular, genomic, and physiological level in regard to diseases affecting Veterans. It includes research on animal models and investigations of tissues, blood, or other biologic specimens from humans, but does not include studies with people.

CLINICAL SCIENCE *RESEARCH AND DEVELOPMENT*

This division focuses on clinical trials and other research involving human volunteers to study new treatments, compare existing therapies, and improve clinical practice and care. *The Cooperative Studies Program* within this division is responsible for planning and conducting VA's large multicenter clinical trials and epidemiological studies on health issues vital to our Nation's Veterans.

CSP: STRONG EVIDENCE TO HELP GUIDE CARE IN VA AND THE NATION

VA Researcher Dr. George Wittenberg with a stroke patient at the Baltimore VA.
PHOTO: MITCH MIRKIN

The Cooperative Studies Program (CSP), a division of the Clinical Research and Development Service in VA's Office of Research and Development, conducts multisite clinical trials and epidemiologic research on key health conditions impacting Veterans.

Through collaborative efforts within VA and with other federal, international, university, and private industry partners, CSP has generated key research findings across a range of diseases and has helped provide definitive evidence for clinical practice within VA and the Nation. From its beginnings in the 1940s, CSP continues to be a national and international leader in clinical research.

In 2011, results from several CSP studies were published in major journals. Below are three examples.

- In a trial led by a VA and Yale University team, Veterans with severe schizophrenia who received biweekly injections of a long-acting antipsychotic drug fared no better than those treated with standard oral drugs. The findings, published in the *New England Journal of Medicine*, are expected to help guide doctors in treating a disease that affects more than 2.2 million Americans and some 100,000 Veterans who use VA health care.
- Veterans with chronic, tough-to-treat posttraumatic stress disorder showed little benefit from an antipsychotic given to augment their existing drug or psychotherapy treatment. The findings appeared in the *Journal of the American Medical Association*.
- In a study that compared two surgical options for coronary artery bypass grafting, the use of a radial artery graft (from the forearm) was equally safe and effective compared with the use of a saphenous vein graft (from the leg). The results were published in the *Journal of the American Medical Association*.

HEALTH SERVICES *RESEARCH AND DEVELOPMENT*

This division supports research to improve the delivery of health care to Veterans. among the areas studied are quality and organization of care; patient access and outcomes; and cost-effectiveness. The division's *Quality Enhancement Research Initiative* (QUERI) is designed to translate research findings into advancements in Veterans' care.

CREATE A NEW HEALTH SERVICES RESEARCH INITIATIVE

In 2011, VA's Health Services Research and Development Service (HSR&D) made significant strides toward implementing recommendations from a workgroup that had called for enhanced collaboration between VA Research and other components of the VA health system. The recommendations have resulted in a new funding mechanism known by the acronym CREATE: Collaborative Research to Enhance Transformation and Excellence.

In the new funding model, a handful of research projects with a common focus and purpose will be linked together in a coordinated effort. Importantly, program offices and other partners within the VA health system will be fully engaged in the research from its very outset. This is an innovative twist on traditional models of research, wherein study findings are generated and validated, and only then efforts begin toward partnering with clinical and program leaders to implement the findings into routine care.

CREATE research projects, expected to start up in 2013, will focus on areas that are of prime importance to Veterans' health and the VA health care system. Funding announcements are expected during 2012. More information will be forthcoming on the HSR&D website: www.hsrd.research.va.gov.

REHABILITATION *RESEARCH AND DEVELOPMENT*

This division conducts research to discover knowledge and create innovations that restore Veterans who have become disabled due to injury or disease to their greatest possible functional capacity in their families, communities, and workplaces.

JRRD: DISSEMINATING REHABILITATION FINDINGS WORLDWIDE

VA's Journal of Research Review and Development responsibly evaluates and disseminates scientific research findings impacting the rehabilitative health care community.

The *Journal of Rehabilitation Research and Development* (JRRD) is an international, peer-reviewed rehabilitation research journal sponsored by VA. The journal accepts original manuscripts from U.S. and international researchers on a broad range of topics, such as assistive technology, cognitive disorders, neurorehabilitation, prosthetics, and telemedicine. *JRRD*, increasingly recognized as a leader in the rehabilitation publishing field, had more than 6.4 million downloads of Web content for 2011, reflecting a more than 1,000 percent increase since 2002. *JRRD* ranked second for the Immediacy Index in the 2010 Journal Citation Reports for publishing topical and urgent content (latest data available).

JRRD now offers 10 issues a year and is available with no restrictions and at no cost in electronic and print formats, as well as through RSS feeds and emailed e-alerts. The journal is also available through various abstract and indexing companies, including PubMed, CrossRef, Social Science Index, Engineering Index, Directory of Open Access Journals, and Google Scholar. Legacy archival materials dating back to 1964 are available on the *JRRD* Web site (www.rehab.research.va.gov/jrrd/index.html), along with timely value-added content—much of it new for 2011 or 2012—such as At a Glance sections in English, Spanish, and traditional and simplified Chinese; podcasts in English and Spanish; scientific video content via *JRRD*'s Web site and YouTube channel (jrrdva); and the *JRRD* Slideshow Project, now available for every article.

CROSS-CUTTING COMPONENTS

Other programs are cross-cutting. The *Program for Research Integrity Development and Education* (PRIDE), for example, is responsible for policy development, guidance, training, and education in relation to the protection of human research participants throughout VA. and the *Technology Transfer Program* is dedicated to translating discoveries and inventions by VA researchers into practice.

PRODUCTIVE PARTNERSHIPS

While embracing its status as an intramural program with close ties to its academic affiliates, the VA Research program also fosters and develops dynamic collaborations with other federal agencies, nonprofit organizations, and private industry. Such teamwork promotes the leveraging of resources, speeds the translation of study results into clinical practice, and maximizes the overall impact of VA Research.

IMPLEMENTATION RESEARCH

A hallmark of VA Research has always been its strong and central focus on Veterans' health care. Because the program is embedded in the VA health care system, and because nearly 7 in 10 VA researchers are also clinicians who provide care to Veterans, VA has long been in the forefront of what is known as implementation research, or implementation science. This field is concerned with how to translate evidence from clinical trials and other studies into everyday clinical practice.

The cornerstone of VA's effort in this area is the Quality Enhancement Research Enhancement Initiative, a program of the Health Services Research and Development Service (HSR&D). QUERI was launched in 1998 as part of a system-wide transformation aimed at improving the quality of care for Veterans. Today, as QUERI investigators continue to collaborate closely with clinical and management partners throughout the VA health system, the program is recognized as a model for speeding the translation of research into practice.

One of the best-known examples of QUERI's achievements in VA is the tripling of vaccination rates among Veterans with spinal cord injury. Studies in the late 1990s had found that Veterans with spinal cord injury—who are at much higher risk for death from pneumonia or the flu—were being vaccinated at rates in the range of only 25 percent.

QUERI developed and put into action a multipronged intervention, in partnership with VA clinicians and program managers. The effort included patient reminders and education, provider reminders and posters, and other measures. As of 2008, vaccination rates had increased by threefold or more, to around 75 percent for influenza and 90 percent for pneumonia, and these positive trends have continued.

In similar fashion, QUERI's Ischemic Heart Disease group worked with VA Patient Care Services, the Office of Quality and Performance, and the Office of Information and Technology to develop what is known as the Clinical Assessment, Reporting and Tracking System for Cardiac Catheterization Laboratories, or CART-CL. The system allows all of VA's nearly 80 cardiac cath labs to feed data on every single procedure into a national computer system. The system tracks quality and patient outcomes and identifies best practices. As of 2011, CART-CL, cited by many experts as a national model for using data to improve clinical performance, was being expanded to other areas of heart care, such as the use of pacemakers and defibrillators.

Another success story involving QUERI and its VA partners concerns lung cancer, which remains the number-one cancer killer of Veterans and all Americans. QUERI worked alongside the Office of Quality and Performance, the Office of Systems Redesign, and the Center for Applied Systems Engineering— as well as with the Center for Implementation Practice and Research Support, a center of excellence supported by HSR&D—to create a series of "toolkits" focused on high-priority medical conditions. The first toolkit focused on lung cancer. It features a Web site with useful tools and resources for clinicians, helping to ensure adherence to clinical guidelines and best practices. As of the end of 2011, more than 2,000 unique users within VA had accessed the site, and many tools had been downloaded.

VA cardiac catherization labs like this one at the Pittsburgh VA Healthcare System feed data on every procedure into a national computer system that tracks quality and outcomes and identifies best practices.
PHOTO: GLEN HANGARD

Further assessments of the toolkit's impact are under way.

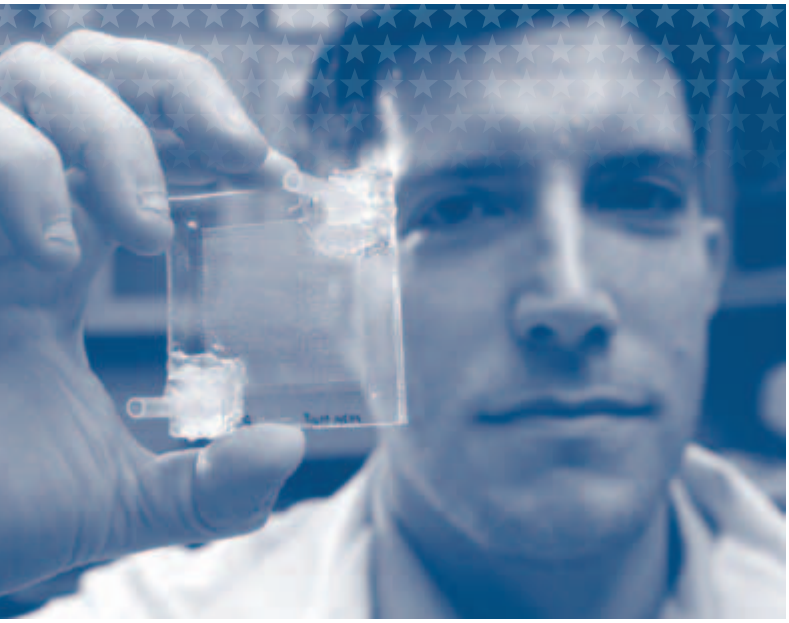
A further example of how VA partners are reaching out to QUERI for help in implementing, evaluating, and enhancing new initiatives: In 2011, VA's well-known "MyHealtheVet" program, which gives Veterans online tools to help them play an active role in their own health care, played a key role in launching e-Health QUERI, the newest of the 10 QUERI groups.

To learn more about QUERI and VA implementation research, visit www.queri.research.va.gov.

TURNING FINDINGS INTO ACTION: A SNAPSHOT OF *QUERI*

David Atkins, MD, MPH, director of VA's Quality Enhancement Research Initiative (QUERI), was interviewed by the Association of American Medical Colleges about QUERI and its role in improving Veterans' health care. Read the interview, adapted with permission from the AAMC Reporter, in VA Research Currents at

www.research.va.gov/currents/apr11/apr11-06.cfm



TECHNOLOGY TRANSFER

Every year, VA researchers develop dozens of new technologies that benefit Veterans and the public. VA's Technology Transfer Program (TTP) translates these developments into practical applications. TTP educates VA employees regarding their obligation to disclose inventions and their rights as federal employees. TTP also evaluates these inventions, files patents when appropriate, and seeks commercial partners to develop them further.

TTP receives some 200 disclosures per year. Because of VA's historic close working relationship with affiliated academic medical centers, most of VA's inventions are jointly owned with our affiliates, who often take the lead in patenting and commercialization. VA has entered into Cooperative Technology Administration Agreements (CTAAs) with more than 60 leading affiliated academic medical centers. CTAAs facilitate intellectual property management for inventions that are jointly owned by VA and its university partners.

TTP directly manages about 20 percent of the disclosed inventions. The remaining 80 percent are managed by our affiliates. TTP and its affiliates file about 40 patent applications each year, and about 10 patents are issued each year. To date, VA and its affiliates have entered into more than 200 licenses with companies to further develop VA-owned inventions.

In addition to managing inventions by VA employees, TTP facilitates the negotiation of Cooperative Research and Development Agreements (CRADAs), agreements that allow industry—mainly pharmaceutical and biotech companies—to work in partnership with VA to benefit Veterans and industry. TTP, together with VA's Office of General Counsel, the Veterans Health Administration, and nonprofit Veterans' Research and Education Foundations, have developed a series of model agreements that serve as templates for new agreements. In addition, VA has negotiated master CRADAs with 14 leading pharmaceutical companies. Master CRADAs are company-specific. Typically, VA and the company formally agree to use the master agreement without further modification for all future collaborations.

NEW ARTIFICIAL LUNG DESIGN MIMICS STRUCTURE OF NATURAL ORGAN

An artificial-lung prototype built by researchers with Case Western Reserve University and VA's Advanced Platform Technology Center mimics the structure of a natural lung, with a lifelike network of tiny air and blood channels, branching down to artificial capillaries thinner than a human hair. Read more in VA Research Currents at

www.research.va.gov/currents/sept11.

RESOURCES

In fiscal year 2011, VA Research and Development supported more than 2,300 research projects at VA medical centers nationwide, ranging from preclinical studies to health services research to multisite clinical trials. Of VA's 153 medical centers, 93 have the capacity to conduct research. VA's vibrant nationwide community of bright, talented investigators publishes some 8,000 to 9,000 articles each year in the medical and scientific literature. VA researchers are frequent contributors to leading journals such as the *New England Journal of Medicine*, the *Journal of the American Medical Association*, and *Science* magazine.

VA funding for research can take several forms:

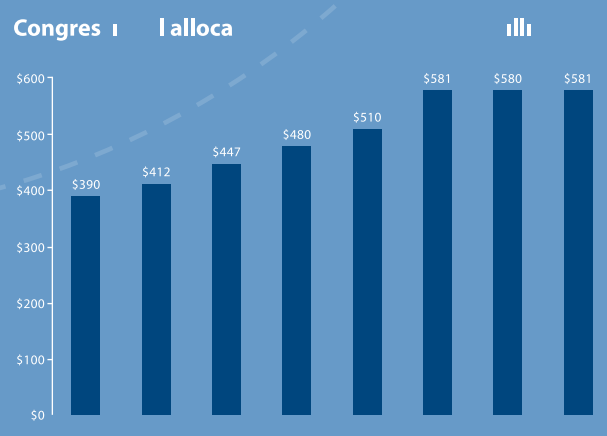
- Investigator-initiated research (Merit Review)
- Mentored research (Career Development)
- Large-scale, multisite clinical trials (Cooperative Studies Program)
- Centers of Excellence
- Service-directed research (sponsored by one of the four services that make up VA Research)

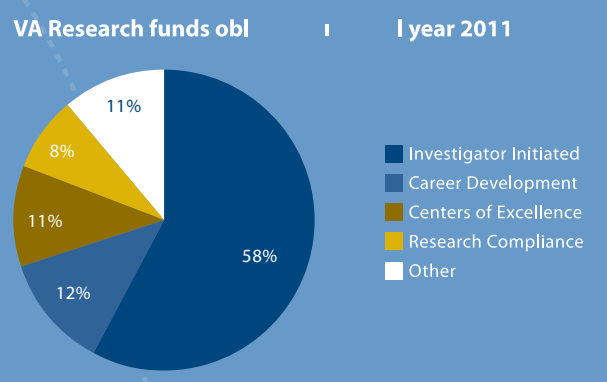
VA Research is an intramural program, meaning that only investigators with a VA appointment can conduct research under VA's auspices. Typically, though, VA researchers collaborate with academic colleagues and others outside VA. Investigators must compete for funding. They submit proposals, which are then peer-reviewed. Only the most meritorious projects are funded. To meet the needs of the entire Veteran population, VA Research invests in a balanced portfolio of studies.

In addition to an annual congressional appropriation (see chart on facing page), VA studies are also supported in part by VA medical care dollars, as well as funding from non-VA sources, such as other federal agencies, nonprofit associations, and industry partners.

In fact, VA researchers are expected to leverage their VA funding whenever possible—that is, seek additional support for non-VA sources— to maximize the scope, quality, and impact of their research and the resulting gains for Veterans. The National Institutes of Health is the most prominent source of such funding for VA investigators. Another benefit of NIH funding is that it assures the public that VA and NIH research projects are of equal quality.

Funding from industry comes mainly from pharmaceutical companies and is typically administered through nonprofit corporations. In 1988, Congress passed legislation that empowered VA medical centers to establish VA affiliated nonprofit research corporations. These entities, also known as research and education foundations, provide flexible funding mechanisms for the administration of non-VA funds for the conduct of VA-approved research. There are currently 84 such nonprofit corporations affiliated with VA medical centers nationwide. (See www.navref.org for more information.)





NATIONAL VA RESEARCH WEEK 2011 CELEBRATES COLLABORATIONS WITH ACADEMIA

VA's Office of Research and Development and research offices at VA medical centers across the nation held activities May 2-6, 2011, in recognition of National VA Research Week. The 2011 event was dedicated to celebrating the 65-year history of research collaboration between VA and its university affiliates.

This fruitful partnership, which has improved health care for generations of Veterans and all Americans, began in 1946 with the passage of Public Law 293, which allowed VA to greatly expand its physician workforce; and with the implementation of VA Policy Memorandum No. 2, which provided the legal basis for affiliations between VA and the Nation's medical schools.

Kickoff events in Washington, DC, were hosted by VA in collaboration with Veterans Service Organizations and the Association of American Medical Colleges (AAMC). As part of the activities, Marine combat Veteran and country music singer/songwriter Stephen Cochran led a discussion panel featuring Veterans who have taken part in VA research. Other guest speakers included Ann Bonham, PhD, chief scientific officer for the AAMC; Army Col. Greg Gadson of the Wounded Warrior Program; E. Albert Reece, MD, PhD, MBA, vice president for medical affairs and dean of the University of Maryland School of Medicine; and Gregg Zoroya, reporter for *USA Today*.

In addition to the Washington, DC, kickoff events, VA facilities around the nation held a variety of research-oriented activities, including open houses and tours of lab and clinical space, Veteran luncheons, research forums, keynote talks by prominent researchers, scientific poster displays, contests, and award ceremonies.

For information on National VA Research Week 2012, visit www.research.va.gov/researchweek.

SENATOR LAUDS VA RESEARCH FOR ADVANCES

On the occasion of National VA Research Week 2011, Sen. Patty Murray (D-Wash.) entered a statement into the Congressional Record recognizing "the accomplishments and discoveries of investigators and scientists at [VA] who have brought about critical advances in health care delivery and medical knowledge through innovative medical research." To read the full statement, visit www.research.va.gov/ResearchWeek/murray_va_research_week_statement.pdf.

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