

# VA

## RESEARCH CURRENTS

Research News from the U.S. Department of Veterans Affairs



Photo by Jerry Dallegre

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 443-759-3456  
[varesearchcurrents@va.gov](mailto:varesearchcurrents@va.gov)

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Editor/writer: Mitch Mirkin  
 Writers: Mike Richman, Tristan Horrom  
 Layout: Robert Williams

Any health information in this newsletter is strictly for informational purposes and is not intended as medical advice. It should not be used to diagnose or treat any condition.



## Intestinal fungi play role in alcoholic liver disease

Chronic alcohol consumption can lead to an imbalance of intestinal fungi, which in turn can lead to chronic liver disease, according to a study that included researchers from the VA San Diego Healthcare System. In mice, alcohol consumption increased the amount of fungus in the intestines, and also allowed the fungus to travel to other parts of the body. This increased the likelihood of liver disease. Treating the mice with antifungal drugs reduced the fungal overgrowth. The researchers also studied human patients, and found that those with alcohol dependence had lower fungal diversity and too much of one specific fungus. The people with this fungal imbalance had higher mortality rates. While several types of fungi naturally occur in the human intestine, they can cause harm if they spread to other parts of the body. The results show that alcohol affects levels of intestinal fungi and that controlling these fungi levels may help treat alcohol-related liver disease, say the researchers. (*Journal of Clinical Investigation*, June 30, 2017)

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## Childhood mistreatment linked to suicidal behavior

Childhood mistreatment is strongly associated with suicidal behavior among new soldiers, according to the Army Study to Assess Risk and Resilience in Servicemembers. The research team, led by a VA San Diego Healthcare System psychiatrist, looked at data for nearly 40,000 soldiers reporting for basic training. They found that those who reported childhood abuse or neglect had higher odds of suicidal thoughts or attempts over their lifetime. More frequent and pervasive mistreatment was more strongly associated with suicidal behavior. Focus on childhood abuse might lead to new ways to reduce suicide risk among new soldiers, say the researchers. (*Journal of Clinical Psychiatry*, May 23, 2017)



Photo: ©princessdlaf

## Mantram repetition program improves insomnia

The mantram repetition program (MRP) helped manage insomnia in patients with PTSD, in a VA San Diego Healthcare System study. The MRP is a “mind-body-spiritual intervention” that “teaches a portable set of cognitive-spiritual skills for symptom management,” according to the research team. Patients who participated in the MRP over eight weeks had significant improvement in insomnia symptoms, compared with before they used the program. MRP participants also had moderate improvements in PTSD symptoms. The results suggest that mantram meditation could be useful to address both insomnia and PTSD symptoms, say the researchers. (*Advances in Nursing Science*, April/June 2017)



Photo by Kevin Walsh

## Homelessness among Veterans seen in specialty mental health care

Researchers from VA New England MIRECC and Yale School of Medicine studied the one-year incidence of homelessness among 300,000 Veterans seen in VA specialty mental health clinics. They found that 5.6 percent of Veterans referred to anxiety or PTSD clinics experienced homelessness. The homelessness rate for the entire Veteran population is about 3.7 percent over a five-year period. Veterans who were unmarried or diagnosed with a drug use disorder were more than twice as likely to become homeless. Black Veterans or those earning less than \$25,000 a year were more than one and a half times as likely to become homeless. Monitoring early signs of housing vulnerability in this population is important to preventing homelessness, say the researchers. (*Psychological Services*, May 2017)



Photo: ©iStock/kevintuss

## Testosterone replacement therapy could lower risk of atrial fibrillation

Returning testosterone to normal levels using testosterone replacement therapy (TRT) appears to significantly decrease the incidence of atrial fibrillation, according to a Kansas City VA Medical Center study. Atrial fibrillation is the most common irregular heart rhythm, and causes a high number of cardiac problems and deaths. Looking at the records of more than 70,000 Veterans, the researchers found that patients whose

testosterone levels were normalized by TRT had significantly lower risk of atrial fibrillation than those who had TRT but not normalized testosterone levels or those who did not receive TRT. The results suggest that low testosterone levels are associated with higher risk of atrial fibrillation, say the researchers. (*Journal of the American Heart Association*, May 9, 2017)



Photo: ©iStock/sudok1

## ALS medicine may help fight drug-resistant cancer

The drug riluzole may be useful in treating some drug-resistant cancers, according to a study including researchers from the Miami VA Healthcare System. The researchers found that reactive oxygen species, chemical compounds containing oxygen, were present in cisplatin-resistant cells. Cisplatin is a common chemotherapy medication. They used riluzole, a drug used to treat ALS, to increase the amount of ROS in these cancerous cells. Increasing the ROS levels selectively killed the cisplatin-resistant cells. The results show that riluzole could be repurposed as an antitumor agent, say the researchers. (*Oncotarget*, July 25, 2017)

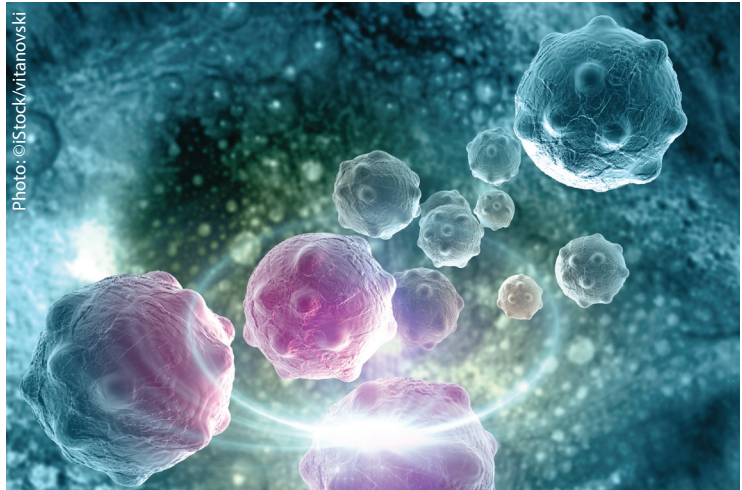


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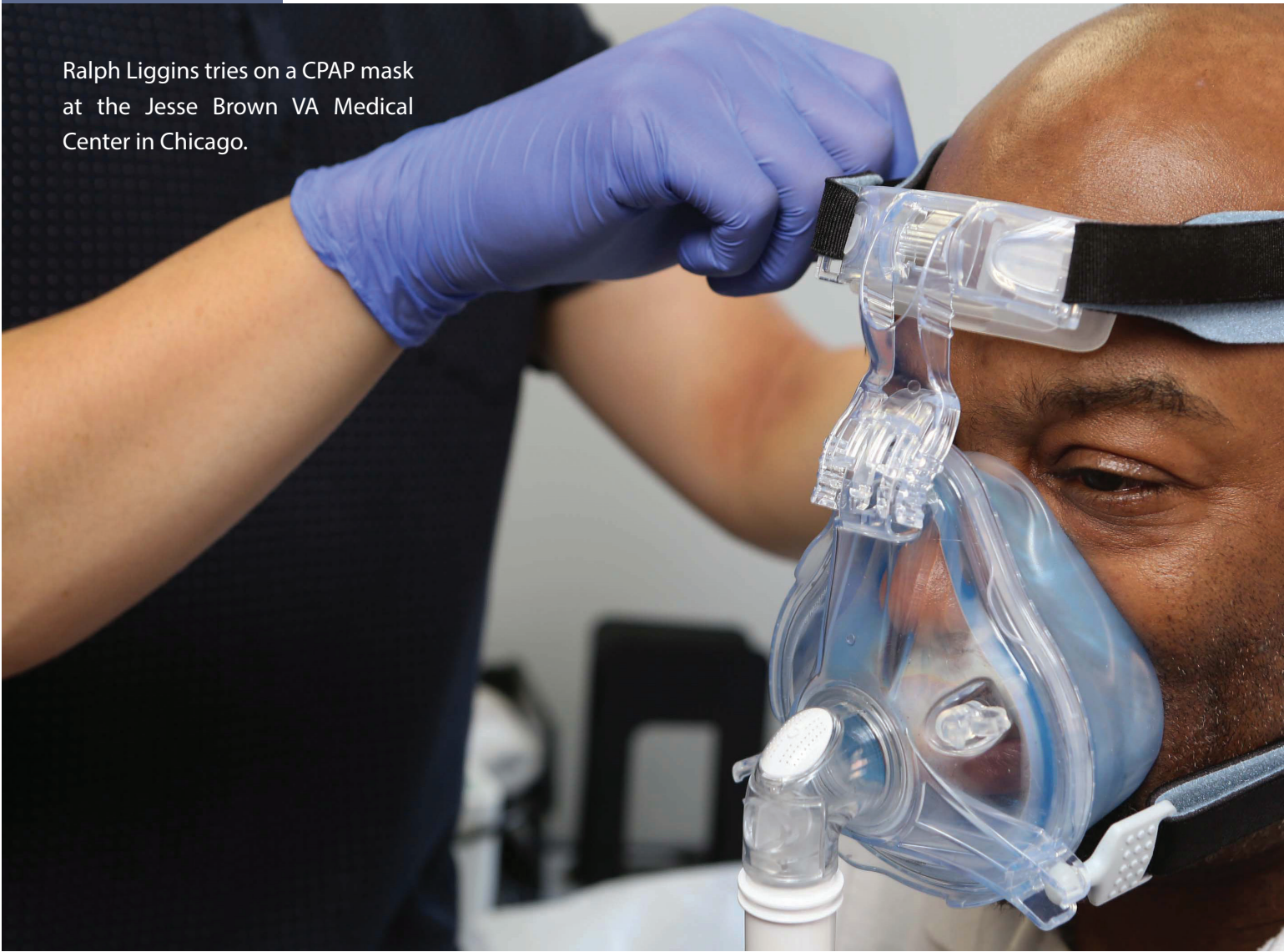
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## ‘Psychological autopsy’ explores suicide risk factors

A team including researchers with the VA San Diego Healthcare System performed “psychological autopsies” to look for differences between soldiers who died by suicide and matched control groups. Researchers talked to next of kin or Army supervisors of soldiers who had died by suicide. They compared responses to those of similar relations of two other groups of soldiers: one matched to the experimental group demographically, and the

other comprising of soldiers who had suicidal thoughts but had not completed suicide. Almost 80 percent of soldiers who died by suicide had a prior mental disorder, and about half told someone that they were considering suicide. The risk factors for those who died by suicide were not different from the risk factors for those with suicidal thoughts, showing that more research is needed into what moves someone from thinking about suicide to completing the act. (*Psychological Medicine*, July 25, 2017)

Ralph Liggins tries on a CPAP mask at the Jesse Brown VA Medical Center in Chicago.



## Don't snore through this: Study aims to highlight risks of sleep apnea in African-Americans—and potential benefits of treatment

A VA study in Chicago is compiling evidence on how CPAP therapy for sleep apnea can benefit a demographic group that has traditionally underused the treatment—African-Americans.

**A**t 5 feet 7 inches tall and 165 pounds, Ralph Liggins is a fit 54-year-old who looks more like a middleweight boxer than your typical patient with obstructive sleep apnea. The condition usually affects heavier people.

But the former Air Force mechanic has been coping with the ailment for some 15 years and has it “really bad,” he says.

“My kids don’t want to sleep near me. They tell me I snore bad,” says Liggins, now a special-education teacher.



Photo by Jerry Dallegge

He is used to getting by on five or six hours of sleep a night, “and out of that about an hour and a half I toss and turn.”

A recent participant in a study at the Jesse Brown VA Medical Center in Chicago, Liggins learned that his breathing stops some 27 times per hour when he sleeps.

“About every three minutes, I stop breathing. I guess it doesn’t stop for too long, because I’m still here.”

The frequent mini-breaks in breathing wreak havoc on the body’s autonomic nervous system and cause the heart to work harder. What’s more, each time breathing stops, the brain sends a subtle wake-up signal to the sleeper, to make sure breathing resumes. As Liggins can attest, the result is sleep that is broken and not restful.

When not treated effectively, sleep apnea can cause a downward spiral in overall health. High blood pressure and other forms of heart disease can worsen. The risk of diabetes and depression go up. And as patients struggle to function on little sleep, they risk getting into car crashes or work accidents.

### CPAP underused among African-Americans

Liggins and other African-Americans, especially men, are at higher-than-average risk for the condition. But they are less likely than non-minorities to use the gold-standard treatment for sleep apnea, a continuous positive airway pressure (CPAP) machine. CPAP users wear a mask while they sleep that gently forces air into the throat. That keeps the airway from collapsing, which is what causes breathing to stop. The device also helps snuff out snoring.

Dr. Bharati Prasad, a pulmo-

nary, critical care, and sleep medicine physician at the Jesse Brown VA, is well-versed in the literature showing that African-Americans are not using CPAP therapy to full advantage. At the same time, she finds it striking that with better adherence, blacks can actually benefit even more dramatically than other groups.

“When I started with this work, we did a retrospective observational study in Veterans, and we found that when adherence was comparable between the groups, blood pressure actually responded better in African-Americans than in whites.”

That drove her to design her latest study, the one Liggins enrolled in. It’s funded by a VA Clinical Sciences Research and Development Career Development award. The goal is to probe deeper into the potential benefits of CPAP for African-Americans, especially with regard to blood pressure. It will involve 220 Veterans—160 who self-identify as African-Americans, and the rest from other races.

“There’s a very big gap in using the equipment,” says Prasad, referring to the racial disparity between whites and blacks. “The benefits related to CPAP treatment, including with regard to blood pressure, are very directly and tightly linked to the length of treatment, and the appropriate use of the treatment.”

By “length of treatment,” Prasad means nightly use of the machine, versus more sporadic use.

Continued on next page

Participants in the study get extra attention to help ensure they are using their CPAP machine appropriately, but they also go through specialized testing.

### Study involves various tests

Their blood pressure is tracked more closely than would occur in routine clinical care. Rather than looking at a one-time snapshot of blood pressure, Prasad wants to see what happens to their pressure throughout the day and night, including during sleep. The participants wear a monitor that takes readings every half hour or so, during a 24-hour period.

“This is very important in sleep apnea,” she says, “because when you sleep, your blood pressure isn’t going lower the way it should normally.”

The study volunteers also get their aortic blood pressure measured: A probe is placed on the neck, on the carotid artery, and a cuff around the thigh measures pressure in the femoral artery. “This looks at the blood pressure nearer to the level of the heart,” explains Prasad, “and calculates the stiffness of the central arteries.” Stiffer arteries are not good for heart health.

There are also urine tests to measure hormones involved in the body’s stress response, as well as DNA tests to validate ancestry. That will help Prasad’s group tease out the role of race per se in sleep apnea and CPAP response, versus related socioeconomic factors.

Last but not least, study volunteers fill out ques-

tionnaires about daytime sleepiness, and perform an alertness test using a clever handheld device.

“We’re doing our best with all the noninvasive measures at our disposal,” says Prasad.

As the study progresses, Prasad hopes to collect some of the strongest data yet on the link between CPAP adherence and blood pressure in African-Americans.

She says the evidence will help lay the foundation for more targeted treatment of sleep apnea in this high-risk population.

### Struggling to make CPAP work

Liggins, for one, is still struggling to make CPAP work for him. He’s been using it about four months, but hasn’t quite adjusted. He acknowledges it helps somewhat with his sleep apnea symptoms and has improved his sleep a bit overall. But even with a well-fitted mask, he says, he finds the device uncomfortable. He usually ends up wearing it only three or four nights a week.

“You feel like you have something on your face,” he says. “You know it’s there.”

He’s says he’s looking into trying a CPAP machine with a different type of mask.

Sometimes the cause of his lack of adherence is rather simple, and somewhat ironic: He’s just too plain tired.

“Sometimes when I get home I’m so tired, I just fall asleep and forget to put it on.” ★



## Standing tall: Trial explores benefits of robotic walking system for paralyzed Vets

Gene Laureano's life changed forever on Nov. 11, 2001. That day, he stood at the top of a 20-foot ladder while trying to repair a canopy in New York City. The ladder slipped from the bottom, sending the 6-foot-3, 210-pound Army Vet plunging to the ground, where he landed on his back.

With his upper body twisted to the side, Laureano tried to get up but realized he couldn't move his legs. He immediately thought he must be paralyzed, a reality confirmed by doctors who performed surgery on him in the hospital. They also told him he'd never walk again.

Laureano didn't believe it: "I was like, 'I'm going to walk again. I don't care what these doctors say.'" "

Today, Laureano, 54, is paralyzed from the navel down. But he's back on his feet thanks to a wearable robotic exoskeleton that facilitates upright movement. The device he uses is touted as the most customizable exoskeleton on the market: the ReWalk 6.0 made by ReWalk Robotics. The computer-controlled product provides powered hip and knee motion to help paraplegics stand upright, walk, turn, and climb and descend stairs. Someone must be near the user at all times; Laureano's wife is next to him when he walks.

At the same time, much remains unknown about exoskeletons such as the ReWalk. More needs to be understood about their benefits and who's best suited to use them.

That's why VA researchers are performing a nationwide study to learn much more about the ReWalk 6.0 and its impact on quality of life. A total of 160 paralyzed Veterans with spinal cord injury are being enrolled at 10 VA medical centers to participate in a four-year study. Enrollment is expected to be completed in August 2020.

The trial, funded by the VA Cooperative Studies Program, is the first to examine the impact of the exoskeleton on home and everyday life. Researchers

will evaluate the technology's ability to improve the mental, social, and physical health of Veterans, and whether it helps them overcome bladder and bowel management difficulties. In prior VA studies, the exoskeleton was used in environments such as walking down the street, in buildings, and at events, but it was returned to VA at the end of the day.

Dr. Ann Spungen, associate director of the Center for the Medical Consequences of Spinal Cord Injury at the James J. Peters VA Medical Center in the Bronx, New York, is leading the trial. She says not everyone with spinal cord injury is eligible or even interested in using an exoskeleton, which has specific requirements.

A user of the 51-pound ReWalk 6.0, for instance, should be about 5 feet 3 inches to 6 feet 3 inches tall and can weigh no more than 220 pounds. One must also have adequate bone density to reduce the risk of fracture, limited muscle spasticity to permit coordination with the device, the ability to hold crutches or a walker, and the availability of a companion should a problem arise.

[Read more at www.research.va.gov/currents](http://www.research.va.gov/currents) ★



Research participants try out the ReWalk at the Bronx VA Medical Center during a visit by Lt. Gen. Thomas Travis, Surgeon General of the U.S. Air Force. (Photo by Lynne Kantor)



Photo: ©digitalkillet

## Pain in the neck? Caregiver-assisted massage might pose solution

A new VA study is teaching Veterans' informal caregivers how to give massages to ease neck pain. A four-hour training is reinforced with a workbook and DVD.

A hhh...

That might be the feeling you get just thinking about a soothing, relaxing neck and shoulder massage. For some, massage is more than a pleasurable stress-reducer; it can be a potent pain reliever.

A 2016 review by VA's Evidence-based Synthesis Program pointed to "potential benefits" of massage for neck and other types of pain, based on past research, but concluded that larger, more rigorous studies are needed.

Now, a new VA study will put massage to the test. The study will have a twist: The focus is on Veterans' caregivers delivering the massages, not professional massage therapists.

The study launched this year and will end in 2021. It will enroll 468 Veterans with chronic neck pain. Of these, 156 will sign up with a "care ally" who will do the massaging. The others will be in one of two control arms: a group that gets massages from professional massage therapists, and another that gets wait-listed and receives "usual care" in the meantime.

## Increasing access to neck massage

The research team, from the Richard L. Roudeboush VA Medical Center in Indianapolis and Indiana University School of Health and Rehabilitation Sciences, presented a poster about their study at the 2017 World Congress on Integrative Medicine and Health, held in May in Germany.

The group was led by Dr. Matthew J. Bair, a health-services researcher with a special interest in pain management, and Dr. Niki Munk, a researcher who is also a licensed massage therapist.

The study team believes their approach may be a way around some of the obstacles that patients face in accessing massage as a pain treatment.

“The current evidence shows that the optimal dose of massage for chronic neck pain is multiple, hour-long sessions per week for multiple weeks,” says Munk. “From a logistical standpoint, that dose is unattainable for most people,” even when cost is taken out of the equation.

That’s where caregivers, or “care allies,” come in. These could be spouses or other intimate partners, family members, friends, or even paid caregivers.

The study is training them to deliver a specific protocol for neck pain in the convenience of the Veteran’s home. They receive a four-hour training session that is reinforced with a workbook and DVD to take home.

“We are not training care allies to be massage therapists,” says Munk. “Massage therapists receive much more in-depth training that involves hundreds of hours of classroom and hand-on experience. The training provided in this study is specific to the ally’s Veteran partner and their specific pain manifestation. Our training focuses on managing neck pain within the parameters of a 30-minute massage, completed in someone’s home. We focus on the safety and comfort of both the Veteran and the ally by teaching a specific massage protocol with instructions for positioning, movement, and techniques.”

## No special equipment needed

The Veteran patients are not passive participants in the training. They have certain skills they have to learn, too.

Munk: “Veteran feedback is absolutely essential. This is an item that we address in our training and subsequently reinforce in the workbook and DVD. We teach Veterans and allies how to discuss pressure, spots that are being addressed, pain levels, etc. We want both the Veteran and the ally to know how to get and give this information to ensure everyone’s comfort and safety.”

One advantage is that no special equipment is needed.

“We teach how to do a seated chair massage with items typically found in the home, such as a kitchen chair and pillows for comfort,”

explains Munk. “A computer or DVD player to play the training DVD is recommended, especially as the care ally is learning the massage protocol.”

The first training session is taking place in July, and the study will progress from there. The researchers don’t know yet how many of the Veteran participants will get pain relief, and how fast it will come. Munk says that based on her experience with similar self-care studies, participants may see some improvement right within the initial training session.

What do professional massage therapists think of enlisting amateurs in this way?

“There may be massage therapists that are concerned, but whether this concern comes from a threat to their livelihood or a concern for the safety of the Veteran or care ally is unclear,” says Munk. “Ultimately, we believe most professionals in the field recognize the benefit of enlisting care allies and others to provide a means through which those who would otherwise not be able to receive massage can do so. In addition, there are simply not enough massage therapists available to provide the optimal dose of massage to treat everyone with chronic neck pain.”

She says her team hopes the care ally approach will prove to be a tool that the massage field can learn to harness and use “for the benefit of all.” ★



## Study suggests possible ties between low cholesterol levels and suicide risk in Vets

Past research suggests a possible link between abnormally low cholesterol and suicide risk. A small study based on data from one VA site indicates the theory may warrant further investigation.

As a public health nurse in the New Jersey Army National Guard, Dr. Charles Reuter has seen members of the U.S. military struggling with thoughts of suicide and knows of others who have died by suicide. The National Guard has the highest rate of suicide of any branch in the military, “which has made me even more aware of the situation,” he says.

“I was and am alarmed by the rise in suicide rates in our military members and Veterans,” says Reuter, also a research associate at the Coatesville Veterans Affairs Medical Center in Pennsylvania. “I wanted to try to find a way to help.”

With that in mind, Reuter has added to the plethora of research examining the alarming problem of suicide in the Veteran population. Understanding that a link between cholesterol and suicide has been researched but

never involving a Veteran sample, he led a study that looked into cholesterol levels as a possible marker of suicide risk among former service members. Past studies on non-Veteran populations have found that abnormally low cholesterol levels may be a biomarker of suicide risk.

Cholesterol is a substance found in most body tissues that is key to the normal function of membranes that surround cells.

Reuter's database study, published in April 2017 in *Research in Nursing & Health*, finds that Veterans with total cholesterol levels below 168 mg/dL (milligrams per decileter) appear to be at higher suicide risk than those with higher levels. That figure is approximately 25 to 30 mg/dL lower than what cardiology groups consider a desirable cholesterol level for adults. High cholesterol levels may put one at risk for heart disease, heart attack, or stroke.

In addition, according to the study, cholesterol levels in Veterans reporting suicide ideation, or thoughts of committing suicide, and suicide attempts were much lower than the group reporting neither. Plus, there was a notable increase in suicidality with as little as a 20 percent reduction in a Veteran's normal cholesterol level.

### No 'hard conclusions' at this point

Despite the results, Reuter and his research team urge caution as to whether there's a definitive link between low cholesterol levels and suicide risk.

"An individual's capacity for suicide is a multifaceted component that is affected by many variables," the researchers write. "It is not clear whether an alteration in an individual's cholesterol level is sufficient in itself to alter the individual's capacity for suicide."

Reuter says, "It's important to know that I'm not saying low cholesterol will cause someone to contemplate, attempt, or commit suicide. It would be wise not to jump to any hard conclusions. Also, my findings at this point are not generalizable. I'm

looking at low cholesterol as affecting somebody who is already at risk for suicide. There is a link here worthy of further research, and I am hoping that further research can contribute to a clinical decision process to help evaluate a Veteran or service member for suicide risk."

Many of the basic functions of the brain contain cholesterol. A reduction in cholesterol may alter the microviscosity, or the friction of a particle that is spreading apart, of the brain cell membrane and reduce the serotonin receptor exposure on the surface of the membrane, Reuter says. That sequence leads to a drop in serotonin uptake from the blood and less serotonin into the brain cell. The resulting imbalance between serotonin and dopamine—important chemical neurotransmitters—can increase depression and aggression, leading to suicide in certain people, he says.

Reuter designed the study to explore whether low cholesterol is linked to factors such as depression in relation to suicidality. The study included 128 Veterans who received care at the Coatesville VA. They were listed in the facility's patient record system during the period of 2009 to 2015 as having experienced suicidal ideation with evidence of escalating intent or a documented suicide attempt, or as having died by suicide.

Based on studies of non-Veterans, the researchers hypothesized that cholesterol levels below 160 mg/dL increase risk for suicide ideation or attempt. Reuter says he was not surprised that Veterans with cholesterol levels below 168 mg/dL appear to have higher suicide risk than those below 160 mg/dL. He notes that the two figures are not "drastically different."

"I say that because I would hope a Veteran who is at risk for suicide is already being cared for, treated, or on someone's radar and receiving the level of care recommended," he says. "That may be a naive statement considering the alarming rate of suicide among our Veterans, but my research is not

Continued on next page

at a stage where it can be used for a clinical decision yet. I'm hoping that as I progress with it, it will eventually be able to have clinical use."

### Subgroup of Vets has huge drop in cholesterol

However, Reuter wasn't expecting such a big difference with one subgroup of Vets in the study. When they were first seen at VA for a medical reason, these Veterans, part of the larger study group, had a mean cholesterol level of 210 mg/dL and didn't report suicide ideation or a suicide attempt. By way of comparison, they had a mean level of 168 mg/dL when they were seen again at a later date and did report suicide ideation or a suicide attempt. The subgroup included only 12 people, but the fact that 9 of the 12 had a major drop in cholesterol level from their first visit indicates that this finding is worth more research, he says.

His study also revealed that suicidal Veterans were younger, were thinner, were more educated, and had more anxiety and sleep problems than those being seen for an issue unrelated to suicidality.

"Research I have read indicates that this is in line with societal changes in the younger generations that have pushed people to higher education, to work

more, and to sleep less," Reuter says. "This trend has led to a more stressed, anxious, and depressed group that may see suicide as a relief or end to the pain. The societal view of mental health has changed. Some also suggest that suicide does not have the stigma associated with it as it did in the past."

Reuter hopes to expand his research on potential links between cholesterol and suicide risk. Based on research he's reviewed, he also plans to consider whether to focus on low-density lipoproteins (LDL)

or high-density lipoproteins (HDL), which are known as "bad cholesterol" and "good cholesterol," respectively, and whether they may impact suicide risk. Both LDL and HDL carry cholesterol to and from cells. He's also looking to measure elements of serotonin and see how they correlate to depression and suicide risk.

"I'm working on research in these areas with VA and the Army National Guard," says Reuter, who is also receiving support from Hunter College—The City University of New York, where he's an assistant professor. "My goal with this research is that it will eventually guide DoD treatment with the actively serving military, as well as treatment of the many Veterans in the VA system." ★

**"It is not clear whether an alteration in an individual's cholesterol level is sufficient in itself to alter the individual's capacity for suicide."**

## New app will target Veterans in cardiac rehab

Cardiac rehab? There's an app for that.

Actually, more than one. But one now in development at the VA Puget Sound Health Care System will stand out from existing products because it targets VA patients—namely, those with a recent heart attack or other heart problem who are undergoing a medically supervised exercise and lifestyle program.

The researchers presented the app at an American Heart Association scientific meeting in April.

“The unique thing about VA FitHeart is that it is specifically for Veterans and will send its data to the new VA Patient Generated Database,” says project lead Dr. Alexis L. Beatty, a cardiologist and health services researcher with VA and the University of Washington.

She adds, “There are several apps that can serve as companions to cardiac rehabilitation programs—these have mostly been designed as commercial care management platforms targeted at providers, hospitals, and health systems.”

Beatty, who holds an undergrad degree in biomedical engineering, points out that while there are a glut of general fitness apps on the market, they do not address the specific needs of cardiac rehab patients.

“Cardiac rehab has many components to it that go beyond tracking that make tailoring for the patient population desirable,” she says.

Furthermore, most are not theory-based. That's a problem, asserts the researcher.

“Much of the available evidence suggests that apps that do not have components that are theory- or evidence-based do not work.”

By all accounts, cardiac rehab is good medicine for those who have survived a heart attack or undergone a heart procedure, or who are coping with a chronic condition such as congestive heart failure. Patients go to a gym where they exercise under medi-

cal supervision. They also get education and counseling about healthy eating and stress reduction.

For VA patients unable to participate at a cardiac rehab center, the VA Office of Rural Health has a “Promising Practices” program of home-based cardiac rehab at certain sites.

According to the American Heart Association, cardiac rehab lowers death rates, eases symptoms such as fatigue or chest pain, and boosts exercise performance

But studies show that fewer than 20 percent of eligible patients take advantage of cardiac rehab. The reasons vary. Beatty believes her team's app will help, at least in VA.

“My hope is that efforts to make cardiac rehabilitation more attractive and accessible to patients will improve participation rates and patient outcomes,” she says. She cites an Australian study that showed better participation and completion—and equal outcomes, in terms of exercise capacity—with app-assisted versus traditional cardiac rehab.

**Read more at [www.research.va.gov/currents](http://www.research.va.gov/currents) ★**



Cardiac rehab has been shown to benefit heart patients in numerous ways, but only about a fifth of those eligible take advantage of it. (Photo for illustrative purposes only. ©iStock/juanmonino)



Photo: ©iStock/Jovanmandic

## Large study assessing needs, experiences of pregnant and postpartum Veterans

Little is known about how women Veterans access and use maternity care during pregnancy and following childbirth. Researchers are thus undertaking one of the most comprehensive VA studies yet on women's maternal health care issues.

**N**early 10 percent of former U.S. military members are women. Many of these women are of reproductive age—45 or younger—resulting in a steep increase in the number of Veterans delivering babies who have used VA maternity benefits in recent years.

In the VA system, maternity care is almost entirely provided by community obstetricians but paid for by VA. Veterans are encouraged to go to private facilities for services such as prenatal screenings, labor and delivery, and postpartum care.

Yet, little is known about how women Veterans access and use maternity care during pregnancy and following childbirth. Researchers are thus undertaking one of the most comprehensive VA studies yet of women's maternal health care issues. It is intended to give a broad assessment of pregnancy and maternity care among female Veterans, with a focus on obstetrics and mental health treatment, and on challenges



receiving care from VA and private providers.

Dr. Kristin Mattocks, associate chief of staff for research and development at the VA Central Western Massachusetts Healthcare System, is leading the VA-funded study. She and her colleagues are two years into the research, with about a year to go.

“The number of women Veterans delivering babies using VHA maternity benefits has nearly doubled in the past five years,” Mattocks says, “and yet virtually nothing is known about how they access and use maternity care services, how their maternity care is coordinated, or how ongoing VHA care, including primary care, specialty care, and mental health care, is managed during and after pregnancy. Coordinating maternity care with ongoing VHA care for pregnant Veterans is crucial because many women using VHA care have complex medical and mental health conditions that may increase their risk for adverse pregnancy outcomes.”

### Researchers have collected ‘great information’

The researchers seek to enroll 500 women in the study and track them during pregnancy and postpartum. They’ve signed up around 300 thus far from 13 VA medical centers located in a combination of urban and rural areas. The 300 have been interviewed at 20 weeks of pregnancy about their physical and mental health status, and about any history of military sexual trauma or problems finding a community obstetrical provider. There’s also screening for drug and alcohol use and domestic violence.

About half of the 300 women have given birth during the course of the program. The mothers are being interviewed at 12 weeks postpartum to assess potential labor and delivery complications, perinatal depression, and infant health status. They are also

asked if they’ve had social support to care for the baby and about child bonding.

Mattocks, also an associate professor of quantitative health sciences, psychiatry, and family medicine at the University of Massachusetts, says her team has collected “great information” so far, including testimonials from women who think they have no access to VA benefits during pregnancy. “That’s just

not true,” she says. “So we have to fill in some information gaps.”

Mental health is of special interest to the researchers. Depression, pain, and PTSD are common conditions among women Veterans using VA care that may call for ongoing treatment during pregnancy. Nearly

50 percent of the pregnant women in the study have been diagnosed with depression and 34 percent with PTSD, Mattocks says.

“Those numbers are certainly higher than civilian numbers,” she says. “I don’t think you’d ever find a sample where 49 percent of pregnant women have a history of depression and certainly not 34 percent PTSD.” She notes that only about 12 percent of the 150 women who have given birth are suffering depression, a statistic that “seems pretty consistent at this point with non-Veterans. But we’re still aiming to learn more about that once we get more women in the study.”

According to Mattocks, most of the women with mental health issues are in some form of VA mental health care around the start of their pregnancy. But by the time they have babies and are in the postpartum period, only about 20 percent are getting mental health care. “So we’re really interested in learning more about why if they’re getting mental health treatment during their pregnancy, why that falls off so much,” she says.

A key part of the study analyzes the challenges women face in accessing non-VA obstetrical care.

**“The number of women Veterans delivering babies using VHA maternity benefits has nearly doubled in the past five years.”**

Continued on next page

Ninety percent of the women in the study are using VA maternity benefits, so VA paid for their treatment. VA covers the costs for prenatal care, labor and delivery, and postnatal care, as well as care to newborns for the first seven days after birth. For the most part, doctors do not perform these services at VA facilities, mainly because not enough female Veterans are having babies to warrant doing so.

In an effort to ensure that women Veterans receive access to high-quality maternity care during their pregnancies, VA policy requires a designated maternity care coordinator (MCC) at each facility to help organize pregnancy care.

“From the moment the woman is pregnant, the maternity care coordinator can help them find an appropriate obstetrician in the community,” Mattocks says. “It turns out we have women who are homeless, and we have women who are suffering from intimate partner violence, so this VA person is supposed to really help them out with maternity care coordination. That’s the program we need to continue to enhance to make sure that that coordination continues during the postpartum period, especially if women are going to end up suffering less postpartum depression and have other issues.”

### One woman’s story

One Veteran who has taken advantage of VA maternity care benefits is Samantha Carrera, an Army Veteran who did a tour in Afghanistan. During her second pregnancy, she was referred to a community-based prenatal care provider after personnel at the Chalmers P. Wylie VA Ambulatory Care Center in Ohio performed prenatal screening blood work to

confirm her pregnancy. The facility’s MCC also made sure Carrera received postpartum supplies paid for by VA, such as a breast pump and nursing bras.

“VA made me feel comfortable during my second pregnancy,” says Carrera, who didn’t take part in Mattocks’ study. “VA doesn’t completely emphasize maternity care but the resources are there. A lot of the nurses had experiences with prenatal care but weren’t able to perform everything necessary. I was advised to go to a civilian doctor sooner rather than later, so I could get to know my doctor.”

To pay for her private care, Carrera tried using the Veterans Choice Program, a VA initiative that covers costs for privately administered health care. The program allows Veterans to seek medical care in the community if they are on a waiting list beyond 30 days at their local VA facility and live at least 40 miles from the closest VA site.

Carrera praised the Choice program because it helps extend services for Veterans. But she also experienced challenges accessing care through the program.

In recent years, Mattocks says, VA medical centers have turned more to recommending Choice for private maternity care. She says a VA facility will direct a woman to a Choice provider if it has determined there are enough obstetricians enrolled in that community.

Does Mattocks expect the findings in her study to influence any VA policy changes?

“I hope the study demonstrates the need to continue to focus on the needs of pregnant Veterans, and on the importance of coordinating VA and non-VA care,” she says. ★

## Study explores ways in which melamine, found in household items, can cause kidney damage



Melamine is commonly used in plastic tableware. (Photo: ©iStock/Xsandra)

A study from the Calcium Signaling Laboratory at the Washington DC VA Medical Center shows how melamine, a chemical found in many plastic products, can contribute toward kidney cell damage and kidney stone formation. The research team demonstrated that melamine acts on a protein that senses extracellular calcium in the kidneys and other organs, called the calcium sensing receptor, and thereby causes cell damage.

The results were published in an April issue of the *American Journal of Physiology*.

### Heat and acid can cause melamine to leak into food

Melamine is a frequently used compound found in laminates, adhesives, cleaning materials, and plastic products. Previous research has shown that high levels of melamine are linked to kidney stones and chronic kidney disease. In one outbreak in China, children who ingested milk-based formula contaminated with melamine, which had been used to manipulate tests of protein content, showed kidney stones and acute kidney injury.

Melamine from plastic plates, cups, and utensils can leak into food when exposed to acids or high temperatures. However, the Food and Drug Administration says that the melamine levels from normal use of these everyday items are “well below the risk level.” The FDA does recommend avoiding excessive heat when using plastic ware, but says that melamine-containing tableware is safe.

Dr. Bidhan C. Bandyopadhyay, corresponding author on the new study, and his team exposed kidney cells to the chemical to better understand the mechanism behind how melamine causes damage.

They showed that melamine can bring on a stress response inside the cell via calcium sensing receptors. This results in increased production of a type of harmful chemical called reactive oxygen species. Higher calcium and reactive oxygen species levels together can cause DNA damage and cell death. Furthermore, such cell death creates debris that can be a factor in kidney stone formation.

The new study also builds on experiments by other groups showing that melamine causes crystals to form when mixed with cyanuric and uric acid, leading to kidney stones. Cyanuric acid is common in many cleaning materials. Uric acid is produced naturally by the body. When mixed with these chemicals, melamine appears to have a much more damaging effect. There is also increasing evidence, says Bandyopadhyay, that melamine has toxic effects on its own. Multiple studies have confirmed that melamine leads to higher reactive oxygen species levels, leading to cell death, although Bandyopadhyay’s lab is the first to show the link with calcium sensing receptors.

**Read more at [www.research.va.gov/currents](http://www.research.va.gov/currents) ★**



Photo by Gene Russell

Army Veteran Luke Sprotte, who was paralyzed in a training accident at Fort Bragg after serving two tours in Iraq, demonstrated the ReWalk exoskeleton at a VA research event on Capitol Hill in May.

## On the Hill: VA researchers visit D.C. to show latest rehab technology

The Friends of VA Medical Care and Health Research coordinated a Capitol Hill event to highlight inventions by VA researchers that promise new mobility and independence for Veterans with disabilities.

**V**A ingenuity was on display in the nation’s capital earlier this year, on May 16, as researchers showed off new technologies that can potentially improve the lives of Veterans and others with limb loss or neurological disorders such as paralysis.

Speaking in a hearing room in the Cannon House Office Building, VA researchers elaborated on the technologies, which are all in the testing phase and can also apply to non-Veterans: a manual standing wheelchair; a computer-controlled robotic exoskeleton; a chip that provides a sense of touch for people with artificial limbs; and a system involving brain-implanted electrodes and an external decoder, letting people who are paralyzed control electronic and robotic devices. A Veteran demonstrated use of each technology except for the brain-implanted electrodes.

The event coincided with VA Research Week, which carried the theme “Bridging the Gap.” About 50 people were in attendance, including congressional staff members and representatives from Friends of VA Medical Care and Health Research (FOVA), which coordinated the event. FOVA, a nonprofit group that helps Veterans receive high-quality health care, briefs members of Congress on VA’s health care and funding needs, raises awareness of the agency’s medical and research programs, and hosts events that highlight VA’s research successes.

VA Chief Research and Development Officer Dr. Rachel Ramoni told the audience the event spoke to the technological strides VA has made.

“To go from laboratory work to real-world products is really what VA is all about, because we’re in the business of helping Veterans and using research to improve the lives of Veterans,” she said. “It’s really amazing to see and hear about some of the early-stage technologies and some technologies that are closer to being ready to be put into the market.”

Dr. Patricia Dorn, director of VA’s Rehabilitation Research and Development Service, added, “Today, we’re going to see with demonstrations the fabulous advances we’re making for Veterans.”

### Restoring a sense of touch

One such advancement is an electrical nerve interface that creates a sense of touch for someone with a prosthetic hand. Sensors in the hand measure the applied pressure as the hand closes around or presses against something. These measurements are then recorded, converted into specially coded electrical signals, and sent through wires to electrodes, or recording devices, surgically implanted in muscles in the forearm and upper arm. The signals are transmitted to the brain through healthy neural pathways not affected by amputation, allowing for a

feeling of sensation or touch.

The system has been used only in feasibility trials. But Dr. Dustin Tyler, who is leading the research, is working with his team to make the technology wearable in everyday life.

“When you use a prosthesis, you know it’s a tool,” says Tyler, a biomedical engineer in the Advanced Platform Technology Research Center at the Louis Stokes Cleveland VA Medical Center. “You see it touch things, but it’s not you. We’re trying to replace the hand. We’re trying to replace the connection. By getting touch, it will get you back your hand. If you’re an amputee, you’ve lost a hand or an arm. What we don’t appreciate is how much of that limb is about function.”

Tyler is also a professor of biomedical engineering at Case Western Reserve University in Cleveland.

Keith Vonderheul, an Army Veteran who lost part of his right arm in an industrial accident in 2005, has had the electrodes implanted and is testing the sensing hand system. He says the sensors in his right hand let him feel items that he touches and grabs. While demonstrating the technology, he came to tears explaining how he can now safely pick up and play with his grandchildren.

“I was afraid to do that before because I had to watch real closely that I don’t squeeze too tight,” he says. “Now, I can feel when I grab a hold of them and touch them. I can tell how hard I’m squeezing. That sensation changes everything.”

### Sending signals through the brain

Another technology that was on display calls for the implantation of electrodes in the brain.

Dr. Leigh Hochberg, director of the Center for Neurorestoration and Neurotechnology at the Providence VA Medical Center, is leading a consortium that developed a computer interface known as

**“Now, I can feel when I grab a hold of [my grandchildren] and touch them. I can tell how hard I’m squeezing.”**

BrainGate. It is designed for quadriplegics, including those who have lost the ability to move their arms and legs due to brain stem stroke or a neurological disease such as amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's Disease. About a dozen people have participated in BrainGate pilot clinical trials thus far, all of whom have limited or no movement in both arms and legs, he says.

The core component of BrainGate is a chip with electrodes that is surgically placed into the brain. The electrodes are designed to pick up neural signals, or thoughts, associated with intended movement and to restore a person's ability to communicate and carry out certain everyday functions.

"Somebody who's unable to move their own arm can control a robotic arm or a computer cursor just by thinking about the movement of their own hand," says Hochberg, also a professor of engineering at Brown University in Rhode Island.

Hochberg showed videos of people who had the electrodes placed in their brain, including a woman who had suffered a stroke that left her unable to speak and without use of her arms, hands, and legs. The woman, sitting in a wheelchair, takes a drink

from a straw in a thermos held by a robotic arm. The arm moves toward her and comes into position so she can reach the straw with her mouth, because she was thinking about doing it. She smiles after accomplishing the feat. It was the first time in 15 years she did not need a caregiver to perform that task.

"We're decoding the neural activity that's associated with her intention to move her hand," Hochberg says. "We've been getting better and better at doing neural decoding, controlling brain signals and bringing them out. If we can listen to that neural activity and understand what those neurons are trying to do, then we can decode."

In an example of what he called "neurally driven point and click," a woman with ALS is shown controlling a computer screen with brain signals and typing at a speed of eight words per minute. Separately, a paralyzed man sends brain signals to a robotic arm that moves and allows him to feed himself mashed potatoes.

A number of other technologies in development record from outside the scalp with surface electrodes, which "of course is easier," Hochberg says. "There's no neurosurgery involved. Our approach is to accept that additional challenge of doing that surgery to get what we hope would be better signals, the signals coming from the brain directly that are actively involved in the control of movement."

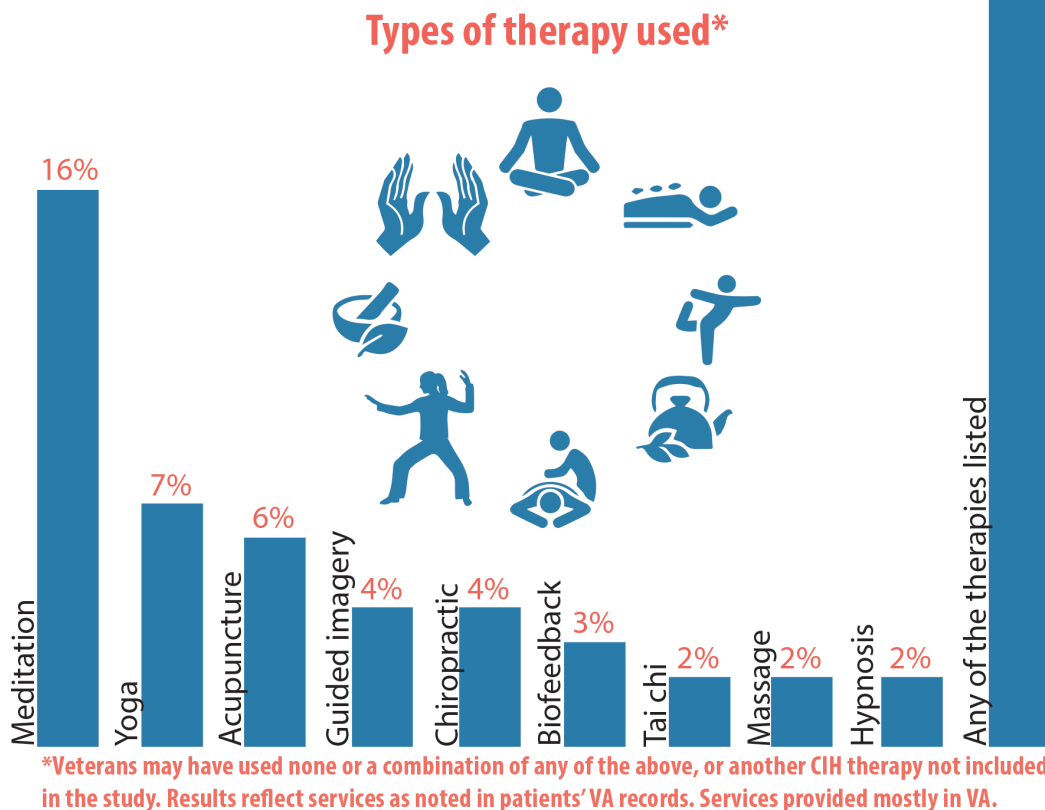
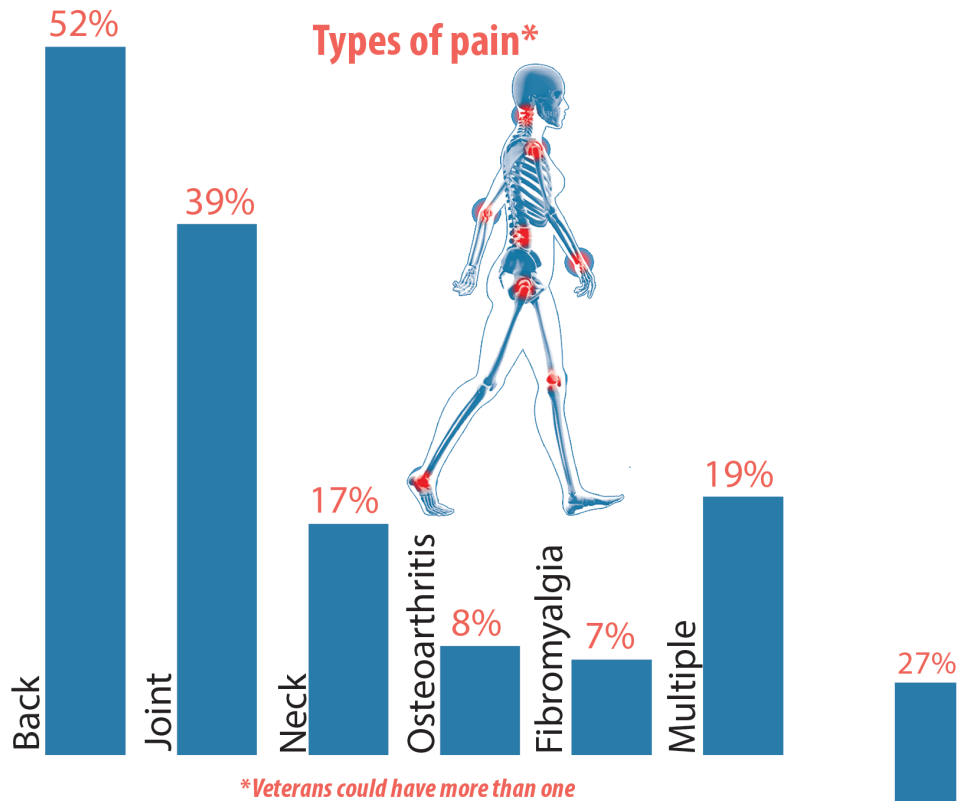
**[Read more at www.research.va.gov/currents](http://www.research.va.gov/currents) ★**



Army Veteran Keith Vonderheuvall, who lost part of his right arm in an accident in 2005, demonstrates a VA-funded invention that creates a sense of touch for someone with a prosthetic hand. (Photo by Gene Russell)

# Complementary and integrative health care for pain

VA researchers studied the use of complementary and integrative health care among more than 540,000 Iraq and Afghanistan Veterans with diagnoses of chronic musculoskeletal pain.



Source: "Use of Complementary and Integrated Health by Patients with Chronic Musculoskeletal Pain," presented at the AcademyHealth annual meeting in June 2017 by a team from the Center for the Study of Healthcare Innovation, Implementation and Policy at the VA Greater Los Angeles Healthcare System.

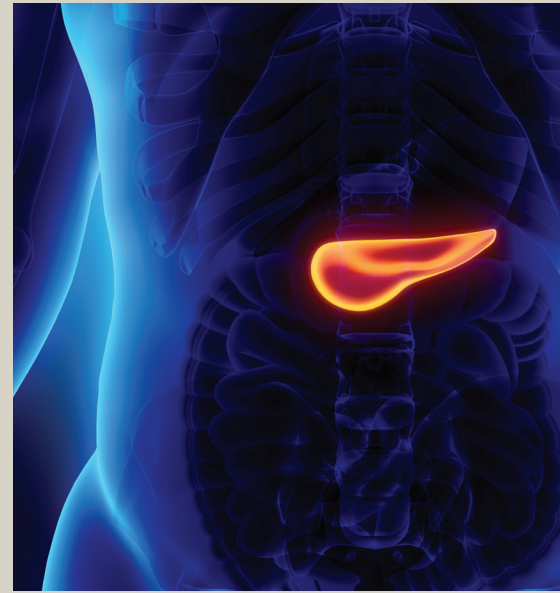


## RESEARCH CURRENTS

Research News from the U.S. Department of Veterans Affairs

### Boosting survival in pancreatic cancer

November is Pancreatic Cancer Awareness Month. The disease affects more than 50,000 Americans per year. Unfortunately, it has a poor prognosis. Researchers at the Michael E. DeBakey VA Medical Center and Baylor College of Medicine recently found that chemotherapy before surgery could lower the risk of death for people with pancreatic cancer. By studying data from nearly 20,000 patients, the team found that those who underwent chemotherapy before surgery survived longer than those who had only surgery to remove the pancreas, or those who received chemotherapy after surgery. The study appeared in the journal *Surgery* in September 2017.



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VA Research Communications | 31 Hopkins Plaza, Ste. 102 | Baltimore, MD 21201  
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