

What antibiotics?—This electron microscope image, taken by Dr. Robert Bonomo in his lab, shows *A. baumannii* growing in ampicillin.

Probing the genes of a ‘bad bug’

Acinetobacter baumannii has won a reputation as a “bad bug”—so dubbed by the Infectious Diseases Society of America for its ever-increasing ability to escape the effect of antibiotics that once thrashed the bacteria. With more than a third of *A. baumannii* infections considered resistant to multiple drug classes, doctors have few options for treating the defiant bug, which tends to infect severely sick, hospitalized patients and can lead to pneumonia, bloodstream infections and other dangerous conditions.

Robert Bonomo, MD, with the Louis Stokes Cleveland VA Medical Center and Case Western Reserve University (CWRU), is investigating the elaborate genetic makeup of *A. baumannii*—known to some as “Iraqibacter” because of the toll it has taken on wounded U.S. troops. The germ has emerged in more than 30

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Study to track burn outcomes

‘Come here, Jones, come here!’ An officer yelled to Staff Sgt. Lee Jones as Jones bolted from the burning Humvee. He started running and then dropped to the ground and rolled to try to douse the flames that engulfed his face, hands and legs. His truck had hit a roadside bomb. The three squad members in the truck with him died in the explosion.

Jones, of the 82nd Airborne, was soon evacuated to a field hospital and then to Germany. But he was in a coma—the flames had eaten away the skin from

nearly half his body—and doctors didn’t give him long to live.

That was in October 2005. Today—after a week at the U.S. military hospital in Germany, four months at the Army burn center in San Antonio, 18 months in VA polytrauma care in Tampa, and now physical therapy at his local VA in North Carolina—Jones is taking life one day at a time with his wife, Maria, and three-year-old daughter, Angel. He says he feels grateful for each milestone in his ongoing

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Hands-on therapy—Physical therapist Juan Jose Villeda of the Polytrauma Rehabilitation Center at the Tampa VA works with Lee Jones, who suffered severe burns and other injuries in Iraq.



Photo by Kevin T. Murray Jr./US Navy



Photo courtesy of US Army



Photo by Jerry T. Combes/US Army

Noise risk—Exposure to loud noise is the most common cause of tinnitus and a major cause of hearing loss. The Department of Defense has stepped up programs in recent years to educate service members about hearing conservation and promote the use of protective equipment such as combat ear plugs.

A more sensible approach to managing tinnitus

Some perceive it as a whistling noise in their ears. Others hear ringing or buzzing. In fact, the auditory condition known as tinnitus can involve one sound or many sounds, and each person with the disorder may hear something a bit different.

What everyone agrees on, though, is that tinnitus—like hearing loss—is a huge problem among veterans. According to Kyle Dennis, PhD, of VA’s Audiology and Speech Pathology National Program Office, “Hearing loss and tinnitus are the first or second most common disabilities in all periods of service since World War II.” A

recent study on disability compensation by VA’s Office of Policy and Planning noted tinnitus as “the most prevalent condition for new enrollees” between 2001 and 2007.

How to manage and treat tinnitus has thus become a huge issue for VA—both because of the impact on veterans’ lives and the cost. Figures from 2005 showed that VA paid more than \$418 million that year in tinnitus compensation.

Progressive approach has five levels of care

Thanks to work at VA’s National Center for Rehabilitative Auditory Research (NCRAR), the agency is crafting a new approach to the problem. The approach hinges on a stepwise method of assessing and treating tinnitus developed by NCRAR scientist Jim Henry, PhD.

The program is called “Progressive Audiologic Tinnitus Management,” or PATM. It was described in a June 2008 article for the American Speech-Language-Hearing Association’s *ASHA Leader* publication, available online at www.asha.org.

PATM involves five levels of care. Henry says that to understand the progression, it’s helpful to think of the tinnitus patient

population in terms of a pyramid. (This model was coined by Robert Dobie, MD, formerly with the National Institutes of Health.) About 80 percent of people—those at the base—are actually not bothered at all by their tinnitus. Others, further up the pyramid, need only basic education on how to manage it. At the top of the pyramid are the relatively few patients who are debilitated by the condition and need long-term individualized therapy.

The key is appropriately assessing patients and getting them the right level and type of care. Each patient should receive a higher level of care only as needed, and care should be tailored to each patient’s needs.

“Not everybody needs therapy or an intervention—maybe education is enough,” notes Stephen Fausti, PhD, director of the NCRAR. “You have to look at the whole situation for each individual and go through the appropriate diagnostic work-up. It’s not one size fits all.”

Adds Henry: “We try to be resourceful and efficient in conducting the lower levels of PATM.” He says the higher levels are “reserved for patients who really need them.”

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The first PATM level is triage—making sure health care providers make appropriate referrals for patients complaining of tinnitus symptoms. The next level is audiologic evaluation. Many patients who complain of tinnitus actually have a hearing problem that can be helped by a hearing aid or other treatment. Sorting out the symptoms—determining whether the complaint is due mainly to hearing loss or tinnitus—is crucial, and Henry’s program offers screening instruments to help providers know the difference.

“We’re finding out that a lot of people think tinnitus is the reason they’re having trouble hearing,” says Henry. “So we had to come up with ways to determine whether it is really a hearing problem or a tinnitus problem, or a little of both. Now, we say that what they really need first is to have a hearing evaluation and a tinnitus *screening*. If you just do that, you’re probably going to take care of 90 percent of patients who come in and complain of tinnitus.”

Hearing aids often help

When the condition is a mix of hearing loss and tinnitus, some patients find that the amplification provided by a hearing aid helps make the tinnitus less noticeable. That and some basic education on tinnitus can be enough to help them manage the condition. Patients also receive an NCRAR-developed manual—*How to Manage Your Tinnitus: A Step-by-Step Workbook*—that can be used with or without further support from clinicians.

Those patients who need more help go on to Level 3, group education. This is a cost-effective way to teach patients how to manage tinnitus, says Henry, and patients benefit from the peer support. One thing

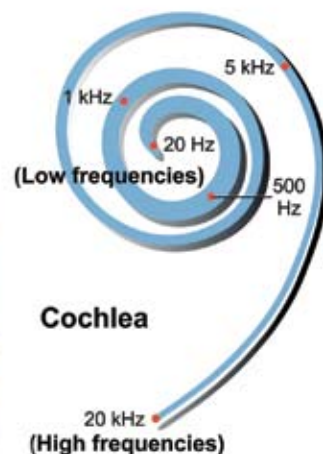
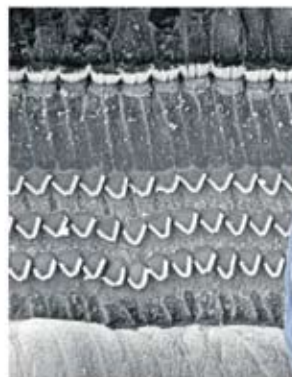


Photo by Michael Moody

Ear expert—In this photo illustration, Dr. Jim Henry of VA’s National Center for Rehabilitative Auditory Research is seen against the background of a page from his book *Tinnitus Retraining Therapy: Patient Counseling Guide*.

they learn is how to use sound. From an NCRAR fact sheet: “Being in a quiet room may make your tinnitus more noticeable. To help with this, try being around low-volume, pleasant sounds, such as music or nature sounds (especially water). Devices that produce sound include radios, CD players, tabletop fountains, sound generators, and electric fans.” Says Henry, “The whole progressive approach is based on education more than anything else.”

PATM’s Level 4 involves in-depth evaluation. Referrals may be made to address issues with sleep, mental health or other areas, and patients are tested to see if they might benefit from devices such as ear-level sound generators.

Level 5 offers individualized management, building on the skills taught in the earlier group work. At this point, some patients will be wearing sound generators or “combination instruments”—hearing aids with built-in

generators. If patients still need help after six months or so of Level 5 care, they may be referred for sound-based treatments such as tinnitus masking or tinnitus retraining therapy. Cognitive behavioral therapy is another option shown to help.

PATM model in clinical trial

The PATM model is now being tested at the James A. Haley VA Medical Center in Tampa. One group of patients is receiving “usual care” while the other is being evaluated and treated through the five-tier approach. Henry is also testing a telephone-based version of PATM designed for patients with tinnitus and traumatic brain injury. “It will involve a similar approach but will obviously be modified because we can’t see the patients in person. And it includes psychological components we

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Now hear this—In this 2007 photo, Dr. Gabrielle Saunders of the NCRAR instructs audiology students. For an overview of NCRAR research and education programs, visit www.ncrar.research.va.gov.

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haven't used before. We're educating the patients about different techniques for relaxation and stress reduction."

Henry and colleagues are also teaching PATM to VA audiologists nationwide and developing a system to test for tinnitus. As of now, tinnitus disability claims rely mainly on patients' self-reports of symptoms. Unlike hearing loss—which can be objectively measured with instrumentation—tinnitus, in most cases, is totally subjective. No one else can hear the noise. Says Henry: "We're working on a computer-automated technique for measuring what we call the psychoacoustic parameters of tinnitus—loudness, pitch, how easily it is masked by noise. We don't think you can take one test and run it on a person and determine if they have tinnitus. But the more tests you run, the more evidence you have of whether the person has tinnitus or not. We anticipate running a battery of six or seven tests and seeing how the patient responds across all of them."

One test, for example, would have patients indicate when a machine-produced tone matches the one they hear in their ears. A patient who does not truly have tinnitus might not be able to respond consistently.

Meanwhile, NCRAR audiologists are working closely with VA clinical policymakers to "develop a comprehensive tinnitus management protocol based on [the PATM protocol]," says Dennis, of VA's national audiology office. He also notes that the topic should receive even greater attention in the future, as Congress recently mandated the establishment of a Department of Defense (DoD) "center of excellence" for hearing loss, tinnitus and other ear disorders. Dennis said VA is collaborating with DoD in planning the center. —

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battle to regain function. "I can use PlayStation. I can go up stairs. I sing in the choir at church," says Jones, his speech still slow and slightly slurred. In addition to burns, he suffered a brain injury and damage to muscles and nerves throughout his body. He had strokes, seizures and a heart attack within two weeks of the blast. His left thumb was amputated. "My hands don't work. I can't feel my feet," says the 26-year-old veteran. He still uses a wheelchair, but increasingly he is able to walk.

Research collaboration between VA and DoD

A new study by researchers with VA and the Department of Defense is looking at long-term outcomes for people like Lee Jones—veterans of the wars in Iraq and Afghanistan who have suffered serious burn injuries. What are their health care and social-service needs months and years after their injuries? How well can they function?

There has been little research to date on the topic. "Until a decade or two ago, there was a much greater mortality rate for people with serious burns," says study co-leader Polly Hitchcock Noel, PhD, of the Veterans Evidence-Based Research Dissemination and Implementation Center (VERDICT), based at the San Antonio VA. "With improvements in acute care, people are now surviving more severe burns. Now there is more of a population in which to study longer-term outcomes."

Lead investigator Valerie Ann Lawrence, MD, MSc, also of VERDICT, adds: "Along with rapid evacuation for military wounded, we are much better at acute resuscitation and innovations such as topical antimicrobials to prevent infection, and artificial skin options. Surgeons are more aggressive about removing tissue they feel won't survive and moving onto grafts earlier." She also cites the development of comprehensive, state-of-the-art burn centers such as that of the U.S. Army Institute of Surgical Research, located at Brooke Army Medical Center—where Jones received skin grafts and other treatments—as a key factor in the increased survival of burn patients.

Lawrence emphasizes that while the odds of surviving burn injuries are better than in the past, managing the burns is complex and may entail "extensive surgical, medical and psychological rehabilitation for years."

The location of combat-related burn injuries on the body is also likely to be different than in the past. Due to improved body armor, troops are more likely to suffer burns to their face, hands and feet, with fewer burns to the torso. "DoD and VA are particularly

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Photo by John Benfitt

Inquiring minds—Dr. Rodney Hayward of VA's Center for Clinical Management Research in Ann Arbor asks a question during a presentation by Dr. Kathryn Rice, of VA and the University of Minnesota, about her study comparing different methods for managing pulmonary disease.

VA Health Services R&D holds its largest meeting ever

More than 660 policymakers, clinicians, and researchers attended the 27th VA Health Services Research and Development Service (HSR&D) National Meeting last month in Baltimore. It was the largest single gathering ever for the group.

The event, titled “Defining Optimal Care: Balancing Quality, Cost, and Patient Preferences” was hosted by HSR&D’s Center for Clinical Management Research in Ann Arbor. It featured 82 papers, 18 workshops and 125 posters on timely topics affecting veterans, including, for example, those recently returned from Iraq or Afghanistan, those with chronic illnesses,

and those living in rural areas. Abstracts and slide presentations are available at www.hsrd.research.va.gov/meetings/2009.

Meeting highlights included a talk by Dr. Michael Kussman, VA’s under secretary for health, who also presented awards to H. Gilbert Welch, MD, MPH (*see story on next page*), and Shirley Meehan, PhD, deputy director of HSR&D. Meehan, who is retiring after 38 years with VA, received the agency’s Exemplary Service Award for her contributions to improving veterans’ lives.

Joel Kupersmith, MD, VA’s chief research and development officer, and Seth

Eisen, MD, MSc, director of HSR&D, spoke about current VA research priorities, such as the care of complex chronic conditions and post-deployment health. They also addressed the role of health services researchers in research compliance.

The keynote address was given by Nicole Lurie, MD, MSPH, of RAND, who spoke about the rapidly changing health care environment and outlined the criteria for “high performance health systems.” Lurie recently assessed the Department of Health and Human Services for the Obama transition team. —

Photo by Jon Gilbert Fox



Dr. H. Gilbert Welch is with the Outcomes Group at the White River Junction (Vt.) VA Medical Center.

HSR&D awardee known for work on ‘excesses of American medicine’

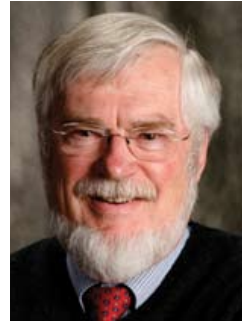
H. Gilbert Welch, MD, MPH, one of the directors and founders of the Outcomes Group at the White River Junction (Vt.) VA, received the 2009 Under Secretary’s Award for Outstanding Achievement in Health Services Research at the 27th national meeting of VA Health Services Research and Development, held last month in Baltimore (see article on previous page).

Welch and his colleagues are known for their sharp analyses of how the medical system often provides care that is unwarranted and unnecessary, causing extra burdens for patients and costs for the nation. From the Outcome Group’s website: “We share a common concern about the excesses of American medicine. We question the assumption that patients always stand to gain from having more health care. We are concerned about advertising and other messages that exaggerate the benefit of health care and minimize the harm (or ignore it entirely).”

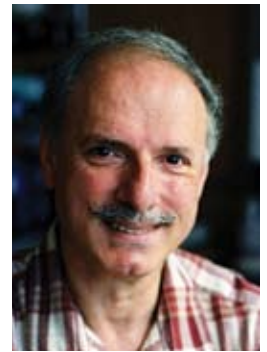
Welch has shared his somewhat controversial views on early detection of cancer and other diseases in a series of op-ed pieces in major newspapers and in a book titled *Should I be Tested for Cancer: Maybe Not and Here’s Why*. The book helps patients understand the benefits and harms of screening for lung, prostate, colon, and other cancers.

Welch teaches at Dartmouth Medical School and mentors fellows and junior faculty. He is a popular lecturer and has authored or coauthored more than 140 journal articles, books and book chapters, including 40 articles in the prestigious *Journal of the American Medical Association*. His latest book, coauthored with Outcomes Group colleagues Lisa Schwartz, MD, MS, and Steven Woloshin, MD, MS, is titled *Know Your Chances: Understanding Health Statistics*. It was featured recently on National Public Radio’s “Talk of the Nation” show. —

George H. DeVries, PhD, of the Hines VA Medical Center and the University of Illinois, was honored with a special issue of *Neurochemical Research*, published in January 2009. The issue includes a retrospective by DeVries on his career in neurochemistry and articles written by his collaborators and students. DeVries’ work has focused on the mechanisms of demyelination—which occurs in central nervous system disorders such as multiple sclerosis—and therapeutic factors that may promote remyelination.



Apostolos P. Georgopoulos, MD, PhD, director of the Brain Sciences Center at the Minneapolis VA and professor at the University of Minnesota, is one of three winners of the 2009 Neuronal Plasticity Prize from La Fondation Ipsen, a French organization dedicated to furthering scientific advancement.



Blase Carabello, MD, acting director of the Michael E. DeBakey VA Medical Center in Houston and vice chairman in the department of medicine at Baylor College of Medicine, received the American College of Cardiology’s Distinguished Scientist Award.



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percent of combat-related injuries in Iraq and Afghanistan, according to a recent article in the *Journal of Orthopedic Research*, and has complicated the recovery of hundreds of troops. It is the threat to American forces, Bonomo says, that largely drives his research interest in the germ.

“This is a world-class challenge that is very important to our troops, and to the VA system that takes care of these men and women when they come back,” he says. Why the focus on the bacteria’s genetic machinery, in particular? Further understanding these genes may make them eventual targets for antibiotics or vaccines, Bonomo explains.

In a study published in the December 2008 issue of the *Journal of Bacteriology*, Bonomo and lead author Mark D. Adams, PhD, associate professor of genetics at the CWRU School of Medicine, compared the genome sequences of three multidrug-resistant *A. baumannii* isolates from infected patients at Walter Reed Army Medical Center with three drug-susceptible isolates. The study, which involved collaborators at the VA Western New York Health Care System and State University of New York at Buffalo, grew out of earlier work in which Bonomo’s lab analyzed the genetic make-up of drug-resistant *A. baumannii* isolated from patients at the Army hospital. That study was published in 2006.

Among the researchers’ questions in the latest study: What features do all isolates of *A. baumannii* share, and which features distinguish the genomes that cause difficult-to-treat infections?

Even very closely related isolates can carry very different set of genes, Bonomo’s team found. This can make some strains responsive to antibiotics and others resistant. The researchers determined that *A. baumannii* can evolve quickly, sometimes

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interested in learning more about the outcomes of relatively isolated hand injuries,” notes Lawrence. Another twist of modern warfare: Burn injuries are also often accompanied by blast effects such as traumatic brain injury, which further complicates recovery.

Study to follow patients for four years

The VA and DoD researchers will assess patients at discharge from the hospital and then yearly for four years. They’ll administer a wide array of questionnaires covering physical, psychological and social issues: How well are patients able to handle everyday activities ranging from bathing, eating and dressing to using the telephone, shopping for groceries and doing light housework? Are they struggling with depression or posttraumatic stress disorder? What coping strategies do they use? Do they have adequate social support? How much pain do they have, and how well can they sleep? Do they use alcohol? Are they able to return to work? How satisfied are they with the quality of their life?

Lawrence cites another long-term issue for burn patients that may figure in the study: “One thing we’ve found they struggle a lot with is scar tissue formation, which may cause deformities and contractures that limit range of motion and make patients feel physically unattractive. Even when scars are on parts of the body that are masked by clothing in public, it can involve intimacy problems in private.”

The researchers say San Antonio is the ideal site for studying burn outcomes. The city is home to DoD’s primary burn center and will soon host a new DoD polytrauma facility. Also, VA plans to build a fifth polytrauma regional center there. The agency currently has such centers in Tampa, Richmond, Minneapolis and Palo Alto.

“We’ll be able to evaluate patients and their situations early on and then follow them as they transition to VA for longer-term care,” says Lawrence.

The ultimate goal is to help people like Lee Jones. The Army veteran will likely continue improving in some areas, while other deficits caused by his injuries may be lifelong. For now, though, he’s content to savor moments like those when he’s holding his little girl—which he wasn’t able to do until recently because of the burns on his hands and arms.

“I’m trying to be happy all the time,” says Jones. “I’m glad I’m alive.” ➔

Report looks at evidence on suicide prevention

A new report from VA’s Evidence Synthesis Program, “Strategies for Suicide Prevention in Veterans,” examines existing research findings on suicide prevention and offers recommendations to help guide VA policy and future research.

The report analyzes which suicide-prevention strategies—for example, hotlines, outreach programs, peer counseling, treatment coordination programs, or new counseling approaches—are backed by the strongest evidence and show the most promise for veterans. It also outlines key issues for consideration in future research. Prepared by researchers with the Greater Los Angeles VA Healthcare System and RAND Evidence-Based Practice Center, the report is available at www.hsrd.research.va.gov/publications/esp. ➔

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www.research.va.gov/ResearchWeek

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changing within a single hospital outbreak or even within an individual. They found that sharing of resistance genes between bacteria—a concept known as “horizontal gene transfer”—occurs frequently.

“We used to think, ‘you treat this bacteria with this drug,’ but now we know that you have to look more carefully not just at the bacteria but at each one’s genetic characteristics,” says Adams.

“Our study painted a very unique picture of *A. baumannii* and its various strategies for acquiring resistance,” Bonomo points out. “The genetic elements were arranged in such a way that the organism became uniquely adaptable to life in a hospital and also to life in patients.” While describing the completed study as the “tip of the iceberg” in understanding *A. baumannii* resistance genes, Bonomo says the research points the way to screening tools that could identify DNA sequences linked with drug resistance, and ultimately to therapies that could circumvent them. Building on the completed study, Bonomo looks forward to garnering a bigger picture with *Acinetobacter* strains gathered from hospitals around the world.



DNA sleuths—Dr. Robert A. Bonomo (right) of the Cleveland VA and Case Western Reserve University (CWRU) and university colleague Dr. Mark Adams are studying the genetic make-up of *Acinetobacter baumannii*, a pathogen that has complicated recovery for many war-wounded veterans.

For now, the medical community must rely on infection control procedures to stem the spread *A. baumannii*—an exceptionally hardy bug that can survive for days on hospital curtains, door handles, medical equipment, and other surfaces. Steps to block its spread are similar to prevention methods for other infections—for example, hand-washing, the use of gowns and gloves, and isolation of infected patients. ➔

Women's health video on Web

In a new four-minute video posted on the VA Research website (www.research.va.gov), Drs. Elizabeth Yano and Donna Washington offer a researchers' perspective on the needs of the growing numbers of women using VA health care.