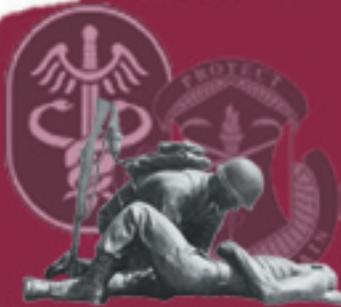


THE POINT

A newsletter for and about the people of the
U.S. Army Medical Research and Materiel Command



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Tourniquet named as Army great invention

A tourniquet tested by Army researchers and recommended as the best to give to every deployed Soldier in Iraq and Afghanistan was honored June 21 as one of the Army's 10 Greatest Inventions for 2005.

The Combat Application Tourniquet was tested along with eight other tourniquets in 2004 at the U.S. Army Institute of Surgical Research in San Antonio. This evaluation was prompted because many deploying Soldiers and units were purchasing tourniquets off the Internet, but the tourniquets' effectiveness had not been determined. Once testing was complete, the institute's researchers recommended the Combat Application Tourniquet be pushed to deployed troops to stop otherwise lethal blood loss.

"If USAISR (U.S. Army Institute of Surgical Research) hadn't done the work, there still wouldn't have been an effective tourniquet out there," said Dr. Tom Walters of the institute that studies how to save the lives of Soldiers who are wounded in combat.

Up until that point, he added, the tourniquets that were available through the military's supply system included a cravat-and-stick tourniquet that Soldiers were taught how to use in basic training and the strap-and-buckle tourniquet that dated back to the American Civil War. The latter "had always been known to be ineffective," Walters said. "The ISR's efforts resulted in removing this tourniquet from the inventory and a removal of its national stock number." A third tourniquet, called the one-handed tourniquet, was also available but, while it worked on arms, it didn't work well on legs.

In the "tourniquet-off" held at the institute during the summer of 2004, 18 volunteers helped evaluate the nine tourniquets' ability to cut off blood flow. When the results were in, the CAT, as well as two other tourniquets, came out on top. The CAT had a smaller learning curve than the others, so researchers recommended it for the Army. The Ma-



At the Army's 10 Greatest Inventions awards ceremony June 21 for the Combat Application Tourniquet were, from left to right, Lt. Gen. Kevin Kiley, Gen. Benjamin Griffin, Bill Howell, Dr. David G. Baer, Dr. Tom Walters and Sgt. Maj. of the Army Kenneth Preston.

rine Corps have adopted it as well.

"Soldiers carry them on their body at all times when outside the wire," said Col. John Holcomb, commander of the Institute for Surgical Research, who has been deployed eight times as a trauma surgeon in Iraq.

Getting a tourniquet to the troops was only part of the work the Institute of Surgical Research accomplished. The team also changed doctrine. During World War II, tourniquets were frequently used but fell out of favor with doctors who were treating evacuated patients, said Walters, a muscle physiologist. "By the time they saw Soldiers with tourniquets, the tourniquets had been on for a long time" and usually led to the limb being amputated, he said. "They (the doctors) had a real bias against them" and didn't recommend them.

However, when Maj. Bob Mabry, the battalion surgeon for the 1st Special Forces Group, and Walters conducted a search of historical documents they found that tourniquets had gotten a bad rap, not because they didn't work, but because tourniquets lacked a champion.

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“What typically happened is that every time there was a call for a change in doctrine (for increased tourniquet use), it would be at the end of a war. There would be a long lag until the next war, and everything would be forgotten. Then it would start all over again,” Walters said. “It was just an unending cycle, it seemed.”

Two studies helped to improve attitudes about tourniquets when both came to the same conclusion: Seven to 10 percent of battlefield deaths in Vietnam and Somalia were caused by profusely bleeding arm or leg wounds, and if a tourniquet had been used, the servicemember would most likely have lived.

“This realization resulted in a real shift in people’s attitudes, so they decided tourniquets weren’t a bad thing at all and, in fact, everyone should have one and be taught to use it,” Walters said.

The lightweight CAT uses a windlass to tighten its strap and can be locked in place once the bleeding has been stopped. It can also be applied with one hand, though that capability hasn’t often been needed during current operations, Walters said.

“Based on all the information that I’ve been getting from the theater, the original scenario where someone is wounded in a firefight or urban warfare situation and they apply it to themselves just hasn’t been the way it’s been working out,” Walters said. “The vast majority of the

wounds have been IEDs (improvised explosive devices) and usually a tourniquet has been put on by somebody else that didn’t get as injured.”

Not only did the institute recommend the CAT, it ended up sending one of its Soldiers, Sgt. 1st Class Dom Greydanus, to teach Special Operations forces how to use it. The institute also helped write tourniquet doctrine for the next common task manual.

“I just figured we would test them, give a recommendation and then we’d be done,” Walters said. “I didn’t anticipate that we’d be so much involved in the doctrinal changes and education. I’m usually dealing with laboratory rats, so this is why this isn’t anything I would have expected to be doing.”

Today, hundreds of thousands of the tourniquets have gone with Soldiers to the U.S. Central Command’s area of responsibility. Based on reports Walters receives from institute personnel who are deployed to Iraq, tourniquets are much more common than ever before.

“Tourniquets are being used on almost every extremity injury, and they are saving lives,” said Holcomb, who was recently deployed as a surgeon

Winning team — CAT

◆ Dr. David G. Baer, U.S. Army Institute of Surgical Research

◆ Col. John B. Holcomb, USAISR
◆ Dr. Thomas J. Walters, USAISR
◆ William H. Howell, U.S. Army Medical Research and Materiel Command

◆ Dr. Joseph C. Wenke, USAISR
◆ Sgt. 1st Class Dominique J. Greydanus, USAISR

◆ Donald L. Parsons, U.S. Army Medical Department Center and School
◆ Master Sgt. Ted C. Westmoreland II, HQ, U.S. Special Operations Command

◆ Mark Esposito, Phil Durango, LLC



at the 10th Combat Support Hospital in Iraq. “Tourniquets were rarely seen early in the war, and now it’s abnormal to see a severe extremity injury without a functional tourniquet in place. There is no pre-hospital device deployed in this war that has saved more lives than tourniquets.”

The ceremony honoring the Army’s 10 Greatest Inventions was held in Crystal City, Va. Accepting honors for the CAT were Mark Esposito, inventor of the CAT, and Bill Howell, the principal assistant for acquisition, U.S. Army Medical Research and Materiel Command, the headquarters for the U.S. Army Institute of Surgical Research. All the inventions were showcased for Army leaders at the event.



Gum to prevent tooth decay during deployments

Sometimes a dentist who treats Soldiers returning from deployments needs a strong stomach.

“Their mouths are disturbing, let’s put it that way,” said Army Maj. Georgia dela Cruz, who treated returning Soldiers at Fort Lewis, Wash., before becoming public health dental staff officer at the U.S. Army Center for Health Promotion and Preventive Medicine. “The average person would probably not be able to stand looking in them. It ain’t pretty.”

Sports drinks, soda, candy and stress all contribute to decay during deployments, but lack of brushing plays into the equation as well, said Col. Dennis Runyan, commander of the Dental and Trauma Research Detachment at Great Lakes, Ill., outside of Chicago.

“One of the age-old stories is how many uses there are for a toothbrush in the field, none of which include brushing teeth,” he said.

To help stem the tide of dental decay during deployments, Army researchers have been working for four years with a tasteless peptide they found helps break up the film that forms on teeth and kills the bacteria that cause oral disease.

“If you’ve gone a day or two without brushing your teeth and run your tongue over your teeth, you can feel that layer of grunge on your teeth. It’s tough to penetrate,” Runyan said. “It’s hard to get things down into that biofilm that will actually kill the bacteria.”

The peptide’s name is a string of consonants—KKVVFVKVFK-NH₂—and is abbreviated KSL, which coincidentally are the initials of the lead researcher’s daughter. Dr. Kai Leung, has worked with the peptide nearly from the beginning of the project, determining its killing power



From left to right, Spc. Katherine D. Gilmore, Spc. Tara D. Crowe and Pvt. 1st Class Tina M. Campbell offer saliva samples that will be used to test a component in a new antiplaque gum at the Dental and Trauma Research Detachment at Great Lakes, Ill. Researchers hope the gum will one day be included in meals ready to eat to help fend off the tooth decay that occurs during deployments. (Photo by Sammy L. Wallace)

and its ability to inhibit bacterial growth. He’s tested KSL’s ability to vanquish lab bacteria, specifically *Streptococcus mutans*, the bacterium that causes dental plaque growth and caries, also called cavities.

It worked.

Leung also developed a model that mimics the environment of the mouth, and enlisted the help of the lab’s workers by asking them to donate saliva for his experiments by spitting in cups to see if the peptide would kill the bacteria in the saliva.

It did.

He’s even tested KSL in animal models to make sure that it doesn’t affect the intestinal tract like some antibiotics do.

It doesn’t.

The dental researchers concluded last year, with the help of Dr. Patrick Deluca at the University of Kentucky, that chewing gum is the best way to deliver KSL.

“Just the act of chewing gum in and of itself helps break up the dental biofilm, so you get a mechanical

See “Gum” page 4



Lab evaluates helmet-mounted display design

Vision researchers at the U.S. Army Aeromedical Research Laboratory completed a three-week flight evaluation of an advanced display design called the TopOwl™ Helmet Mounted Sight and Display System.

The system projects imagery onto a visor worn in front of the pilot's eyes. Helmet mounted displays provide the pilot with the capability to view the outside world using night vision sensors while also presenting essential aircraft status information such as airspeed, altitude, heading and more.

TopOwl™ projects the outside scene and associated symbology onto two circular reflec-

tive surfaces with a fully overlapped, 40-degree, binocular field of view. With training, the pilots also can look through the visor to read moving maps and other information on the instrument panel.

The evaluation at the U.S. Army Aeromedical Research Laboratory consisted of a series of laboratory measurements and in-flight assessments using the laboratory's JUH-60 Black Hawk helicopter.

"The TopOwl™ HMD design was motivated by the need to reduce the weight and the center of gravity problems that plague all HMD designs," said Clarence E. Rash, an optical physicist and the lead investi-



The Thales TopOwl™ helmet-mounted display

gator on the USAARL evaluation team.

The findings of the flight evaluation of the TopOwl™ HMD will provide Army program managers with objective data needed to make decisions about future helmet-mounted display programs.—*By Lisa Dueringer, USAARL*

"Gum," continued from page 3

breakup," Runyan said. "Then we have an added ingredient that actually helps kill and control the oral pathogenic bacteria as you chew the gum."

Gum is already available in meals ready to eat so Runyan said it would be a logical step to include the anti-plaque gum in them. "We give them the sugar-free gum in the same MRE that we give them Skittles. It's like giving an alcoholic antabuse and having him wash it down with a shot of Jack Daniels," he said.

The Combat Feeding Program officials in Natick, Mass., with whom Runyan has spoken to aren't making any promises about including it in MREs just yet.

"They deal with costs. I would say they're interested but guarded until we can give them a good final cost," the colonel said. Leung estimates each piece will cost about a dime or less.

Because of the detachment's proximity to the gum manufacturer Wrigley, they initially hoped to work with that company. However, because the Army wants to make the claim the peptide can control and kill plaque bacteria, it must go

through the Food and Drug Administration's drug approval process.

Wrigley doesn't deal with drugs, only additives, in gum, so that left the researchers with just one company, Fertin Pharma in Denmark, which has a facility to produce drugs in gum form, like nicotine gum.

"It's much quicker to get to the market calling it (the peptide) an additive, but then you can't make the claims that you could if it were a drug," Runyan said. "If it's not a drug, I'm not sure the Natick people would be interested. We're going the tough route, the drug route, until someone tells us from big Army to go the easier route."

Runyan said he hopes the gum will be in clinical trials three to four years from now. He stressed that when the gum is eventually fielded, it shouldn't be seen as a replacement for good oral hygiene.

"The purpose of this gum is not to be a substitute for good flossing and brushing," he said. "This will hold them over in times when Soldiers—because of operations tempo or availability—don't have the time or the inclination to brush or floss when they're in the war zone."



Scientists make gains on injury prevention

Scientists at the U.S. Army Research Institute of Environmental Medicine hope to improve warfighter performance using their knowledge of musculoskeletal injuries and the effects of non-steroidal anti-inflammatory drugs on the body.

Soldiers have extreme physical demands placed on their bodies, including the need to move rapidly while carrying heavy loads over difficult terrain. As a result musculoskeletal injuries, which include injuries of bones, joints, ligaments, tendons, muscles and other soft tissues are prevalent among the nation's warfighters.

"Musculoskeletal injuries are one of the top medical problems reported by Soldiers, especially during their physical training," said Dr. Edward Zambraski, division chief, Military Performance Division, USARIEM

Musculoskeletal injuries may impact not only a Soldier's ability to do his job well, but can also result in significant time away from the job to allow for recovery. In some cases, the injuries can lead to a disability discharge.

According to Dr. (Col.) Paul Amoroso, former USARIEM research epidemiologist, musculoskeletal injuries are the number one cause of disability discharge. By investigating the prevalence of musculoskeletal injuries and assessing how Soldiers are being trained, USARIEM scientists hope to find ways to improve Soldier performance while reducing injury. The scientists also hope to reduce the downtime caused by Soldier injuries.

Problems with musculoskeletal training injuries have been studied most frequently during basic combat training. It's not unusual for 25 percent of men and 50 percent of women basic trainees to experience a musculoskeletal injury. USARIEM, in collaboration with the U.S. Army Center for Health Promotion and Preventive Medicine at Aberdeen Proving Ground, Md., has been investigating basic training injuries since 1980.

Zambraski, a leading expert on the effects of non-steroidal anti-inflammatory drugs on kidney function, said that much of Soldier use and overuse of those drugs is driven by their high rate of musculoskeletal injuries.



Soldiers who need to move rapidly while carrying heavy loads over difficult terrain may injure bones, joints, ligaments, tendons, muscles and other soft tissues.

"In an effort to keep going, many warfighters rely on non-steroidal anti-inflammatory drugs, such as ibuprofen, aspirin and naproxen. These pain relievers are fine in small doses," said Zambraski. "But problems arise when Soldiers take them too frequently at too high a dosage."

Zambraski explained that the drugs work by temporarily blocking the body's natural production of prostaglandins, which promote inflammation and pain but also perform other important and essential bodily functions.

In the stomach, prostaglandins protect the lining from acid. By taking too many non-steroidal anti-inflammatory drugs, Soldiers put themselves at risk for ulcers or other gastrointestinal problems. In the kidneys, vasodilator prostaglandins widen blood vessels, helping to maintain renal blood flow and to protect kidney function.

According to Zambraski, one goal of USARIEM's research program is to reduce musculoskeletal injuries which would have the beneficial effect of reducing the need for non-steroidal anti-inflammatory drugs among Soldiers. This research is also examining the effects of other compounds that can reduce inflammation and pain but not decrease the body's production of beneficial prostaglandins.



Researcher creates shock detector

A novel medical device in development may give providers a better measure than traditional means in gauging just how well a severely injured patient is faring, especially during long evacuation flights.

“It is not uncommon for injured soldiers in Iraq to be considered stable ... only to destabilize during transport (to Germany or the United States),”

said Dr. Babs Soller of the University of Massachusetts Medical School. “Our device should help alert the caregiver of impending problems.”

Developed by a team at the medical school, the device is a noninvasive sensor that caregivers could use to

monitor oxygen and acid levels in muscles—two known indicators of circulatory shock, a life-threatening condition that can occur after a patient loses a lot of blood. To detect shock, medical providers currently depend on the tried, true and inadequate markers of blood pressure and heart rate.

Soller is a spectroscopist, a scientist who studies the interaction between light and matter. Her device works by letting providers see how much oxygen a patient’s tissues are getting because when blood flow to the muscle starts to decrease, it’s an indicator that blood flow to the internal organs has also decreased.

“These changes happen earlier in

shock than changes in the heart’s ability to pump blood, which is what is measured with blood pressure and heart rate,” said Soller,

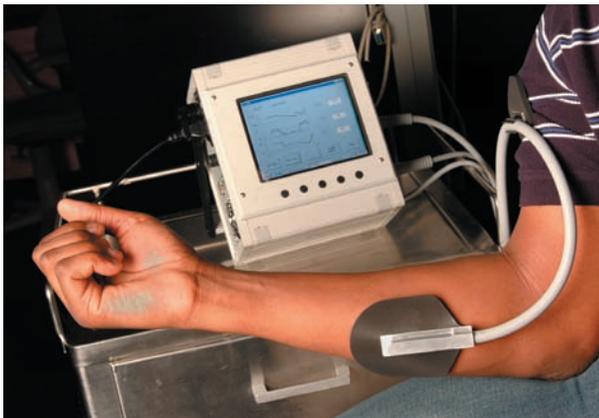
Her device is based on the physiological fact that when oxygen supply decreases to a critical level, tissues start producing lactic acid. This acid production decreases the pH of the tissue, causing changes in tissue spectra, which Soller is adept at measuring. Since embarking on this project almost a decade ago, she and her colleagues have developed hardware, software and algorithms to calculate muscle pH, oxygen and hematocrit from near infrared spectra readings.

“These parameters together allow us to investigate how well oxygen is being delivered to tissue and if the available oxygen is adequate to meet the cells’ energy requirements,” Soller said.

“Blood samples have also been used in medical settings to determine oxygen levels, but those samples aren’t ideal for predicting shock,” said Dr. Vic Convertino, a research physiologist with the U.S. Army Institute of Surgical Research whose job includes developing tools that help medics make better decisions.

“When you take a blood sample, it usually represents a mixture of contents coming from all the tissues, so the change that you measure may not be nearly as large as that being produced in the tissues. It may not give as critical a signal early on,” he said. “Eventually content changes in the blood will catch up to that in the tissue, but by then the patient may really be in trouble. Getting information at the tissue level, noninvasively, is the novel part of Dr. Soller’s technology.”

Soller’s research endeavors were



Dr. Babs Soller is developing a sensor system that will measure blood and tissue chemistry with no need for blood draws or incisions. (Photo by L. Barry Hetherington, National Space Biomedical Research Institute)

“Detector,” continued from page 7

funded, in part, by a grant from the DoD’s Peer Reviewed Medical Research Program. Congress created the program in 1999 to promote research in health issues the military faces. Since its inception through 2005, the program has spent almost \$300 million to fund nearly 200 projects in a range of medical topics, including combat casualty care and technology and infectious disease research.

With four patents issued and three patents pending, the sensor system is currently being put through its paces at Soller’s school, NASA Johnson Space Center in Houston and the U.S. Army Institute of Surgical Research in San Antonio. In developing the sensor, Soller’s team addressed variables like skin pigmentation and fat while considering what the military would need in the device, like stable output that’s not interrupted during a medical evacuation.

Though it’s user friendly, Soller said she wants to make future versions of the sensor lighter and more portable for the military. A system for hospital use is being developed by Nimbis Medical, which has rights to Soller’s patents.

“Right now the device consists of a pad that holds the sensor in place over the area of tissue or muscle that you are making the measurement from and has a long fiber optic cable that goes to the monitor,” Convertino said. “Obviously all of that mass is not conducive to being on the battlefield and being carried around by a medic. I think what we would all like to see is a device that is miniaturized and lighter, to be a plug and play type thing, so that it becomes an integral part of the other medical monitors that are available, particularly in emergency vehicles during transport of the casualty.”

Convertino said early tests of the system at the Institute of Surgical Research have gone well. Earlier this year 10 people volunteered to have the lower part of their body placed in a lower body negative pressure chamber with an airtight seal formed around their waists. Researchers then vacuumed the air from the chamber, which sucked the blood away from their hearts and mimicked what happens during hemorrhage.



Dr. Babs Soller tests her noninvasive device that detects shock in a lower body negative pressure chamber at the U.S. Army Institute of Surgical Research in San Antonio. The chamber lets researchers safely reduce blood flow to the heart and produce an effect on the cardiovascular system almost like a continuous bleed.

“We can reduce the blood flow to the heart and brain progressively by decreasing the negative pressure and produce an effect on the cardiovascular system almost like a continuous bleed,” Convertino said. “Eventually a person will develop symptoms much like an individual going into shock and may eventually become unconscious. We take individuals right to the point where they get symptomatic, and then turn the negative pressure off so that the blood returns immediately to the head and heart and they’re fine.”

Preliminary data from the chamber tests arrived April 18, and looked promising, Convertino said. “Dr. Soller’s device is doing what we think it was supposed to do,” he said. Another researcher at the institute, Dr. Andriy Batchinsky, is collecting data on patients at the Army Burn Center at Brooke Army Medical Center. This summer, researchers from Virginia Commonwealth University tested the sensor to ensure that what Soller believes she’s measuring is actually what’s being measured.

“It is incredibly exciting to create a noninvasive instrument that we can then give to a physiologist or physician to use in their work,” Soller said. “A noninvasive device lets them easily explore new methods of providing better care for patients. We look forward to the day when it will actually be used to help care for patients.”



Institute hosts summer student ceremony

For the third consecutive year, the U.S. Army Medical Research Institute of Chemical Defense hosted the closing day ceremony for students at Aberdeen Proving Ground participating in the George Washington University Science and Engineering Apprenticeship Program. The program offers high school students with an aptitude and interest in mathematics and science the opportunity to spend



Dr. James Dillman demonstrates to GW students Jessyca Gordon and Steven Wise how to pipette a probe sample into a genechip microarray for hybridization and analysis of gene expression. (Photo by Stephanie Froberg)

to spend eight weeks of the summer working in a Department of Defense laboratory. At the end of the apprenticeship students prepare a paper and, on the closing day, give a brief presentation on their project. This year's closing ceremony was held Aug. 11.

MRICD scientists mentored 19 GW students this summer, while researchers at the U.S. Army Research, Development and Engineering Command mentored 24, and those at the U.S. Army Research Laboratory mentored 12.

MRICD commander, Col. Brian J. Lukey, welcomed the students, guests and mentors before the student presentations began.

"You can be very proud of your children," he said to the parents in the au-

dience. "The GW program is extremely competitive and very difficult to get into. Participation in the GW program will increase these students' chances of getting into the college they want and getting the jobs they want in the future."

U.S. military research benefits not just the warfighter, but the nation overall, Lukey told the audience. The quality of this research is a result of the "intellectual aptitude of our scientists, the same scientists who volunteer to be mentors to these GW students," he said.

One objective of the program is to expose promising students to science and mathematics in DoD laboratories to encourage the students to consider these laboratories when they are ready to join the workforce.

"The people, facilities and resources of DoD laboratories are phenomenal. Consider them when you are ready to start your career," said Lukey, who admitted to being so impressed by such advantages during his first tour of duty at MRICD as a captain/researcher that he decided to stay in the Army.

Two former GW apprentices, now college students who work at MRICD during the summer under the Oak Ridge Institute of Science and Education Program, also shared their thoughts on SEAP with the audience.

William Wrobel, finishing up his fifth summer at MRICD, spent his first two as a GW apprentice. A chemistry major at Boston College, Wrobel said his experiences at MRICD provided many opportunities in college, some not generally available to undergraduates. This past year at Boston College, his sophomore year, he was named chemist of year.

Kenneth Leiter is junior chemistry/computer science major at Duke Uni-

See "Students" page 9

“Students,” continued from page 8

versity. He, too, spent two summers as a GW apprentice at MRICD.

“My learning experiences as a GW at MRICD have shaped my learning experiences in college,” Leiter said, who called the eight-week apprenticeship an intellectual journey.

“Today is what this intellectual journey is about,” he said, “demonstrating to others and to yourself all that you have learned.”

For two hours, across MRICD’s campus in various meeting and conference rooms, the apprentices were given that opportunity. Their projects covered a broad range of activities in scientific disciplines, including molecular biology, biochemistry, behavioral sciences, toxicology and chemistry. They worked on method and software development, as well as test and evaluation of equipment and materials.

Stanley Strawbridge, a junior in high school this fall, was interested in bench chemistry, according to his MRICD mentor Dr. Benedict Capacio. For his project, Strawbridge was involved in developing methods to extract metabolites of chemical warfare agents from synthetic urine as a possible means of detecting exposure to specific agents.

“He was bright, energetic and extremely motivated,” said Capacio of Strawbridge.

Colleen Roxas, who will be a junior at Aberdeen High School, turned her interest in art into a GW experience

different from many of her fellow participants. Roxas worked with MRICD’s graphics department, which designs for the research staff, among other things, scientific posters of their data for presentation at national and international professional meetings. Roxas learned about the process of design and how art and technology can be combined to communicate information.

“I learned a lot about graphic design,” said Roxas of her summer project. “I especially liked learning the computer design software.” She said her summer project introduced her to possible future careers in which she could apply her interest and talent in art.

The experience can be just as rewarding for the mentors. Many scientist volunteer as mentors as a way to give back, a way to build the scientists and engineers of the future, and many have seen their former apprentices go on to pursue careers in science and medicine.

For Douglas Cerasoli, who served as MRICD’s program coordinator along with John McDonough, the reasons for mentoring were simple.

“I like bringing students into my lab. They bring new life, new ideas, and new jargon to the lab,” he said “Makes the summer go by more quickly.”

—By *Cindy Kronman,*
USAMRICD

“My learning experiences ... at MRICD have shaped my learning experiences in college. Today is what this intellectual journey is about, demonstrating to others and to yourself all that you have learned.”

—**Kenneth Leiter,**
**Junior chemistry/
computer science
Duke University**



Scientists alleviate high altitude sickness

Soldiers being sent to Afghanistan are often quickly deployed to high-altitude environments via helicopter, leaving little time for their bodies to adjust and putting them at risk for contracting high-altitude sickness. High-altitude conditions, which include adjusting to less oxygen and thinner

atmosphere, can affect even the most physically fit Soldier.

High-altitude conditions, at a minimum, affect stamina and cause Soldiers to fatigue much more quickly, said Dr. Stephen Muza of the U.S. Army Research Institute of Environmental Medicine. Other problems can develop as well. The most prevalent type of altitude sickness is acute mountain sickness, which can cause headaches, dizziness and nausea and make it difficult to fall asleep. Muza said AMS typically

occurs within 4-12 hours.

Although most people experience the symptoms of AMS, 100 percent of the population experiences a decline in task performance.

“Soldiers can still make accurate decisions, but it takes them longer to do so. Altitudes above 5,000 feet can impair vision, especially the ability to see color,” he said.

AMS symptoms will often dissipate once a Soldier’s body adjusts to the high-altitude environment, but

sometimes AMS can intensify into pulmonary edema, which is caused by a build up of fluid in the lungs and can lead to shortness of breath and heavy coughing. AMS can also transform into cerebral edema, which is caused by an increased blood flow to the brain. Cerebral edema can cause swelling, disorientation, hallucinations and can affect physical coordination. It can be deadly if left untreated.

USARIEM scientists are investigating the use of preexposure to high-altitude conditions to prevent altitude sickness to help Soldiers who need to make sudden and prolonged ascents to altitudes of 5,000 to 14,000 feet. Soldiers will perform myriad tasks in USARIEM’s hypoxia room and hyobaric chamber, which replicates a high-altitude environment. The hypoxia room is a low-cost, low-oxygen environment and can be replicated anywhere, even in small nuclear, biological and chemical shelters.

The study will document changes in Soldier performance under both high-altitude and low-altitude conditions. The study will also document changes in performance and well-being before and after hypoxia room treatments. USARIEM’s investigation will reveal exactly how much time Soldiers need to be exposed to high altitude conditions to offset the effects of altitude sickness. Based on observations so far, Muza said it appears Soldiers exposed to 10,000-14,500 feet for three or four hours a day are ready to undertake their mission with less sickness and higher performance.

If the hypoxia room treatments are done over six to seven days, Muza said the treatments can increase physical stamina by 30 percent and can reduce or eliminate AMS. USARIEM scientists have found that two-thirds



Dr. Stephen Muza, left, and co-investigator Dr. Beth Beidleman, both of the U.S. Army Research Institute of Environmental Medicine, monitor human research volunteer, Pvt. David Kratzer. This test is measuring the ability of the heart and lungs to deliver oxygen to the exercising muscle. (Warrior photo by Sarah Underhill)

See “Altitude” page 11

Institute hosts 15th successful conference

The U.S. Army Medical Research Institute of Chemical Defense hosted the 15th Biennial Medical Chemical Defense Bioscience Conference June 5-9 at the Marriott Hunt Valley Inn, Hunt Valley, Md. This year the conference was sponsored by the Joint Science and Technology Office for Chemical and Biological Defense and the Defense Threat Reduction Agency.

“The Bioscience Review is the premier North American meeting for chemical warfare medical countermeasures and provides an unparalleled opportunity for like-minded scientists to network and collaborate research,” said attendee Thomas Sawyer from Canada’s Defence Research and Development Center.

Three hundred ninety attendees from 14 countries and representing 17 federal organizations, 30 academic institutions and 28 private corporations attended. The theme of the conference was “Putting the Pieces Together,” and the program was organized around the DTRA capability areas—pretreatments, therapeutics and diagnostics—for the chemical defense program. Three special workshops were held: a case study of a sarin exposure casualty in Iraq, galanthamine as a neuroprotective therapy for nerve agent exposures

and choosing the right oxime. All three sessions were well attended by participants, who contributed to the workshop discussions. The conference’s final session highlighted partnership initiatives.

Dr. Bruno Papirmeister, a former MRICD scientist renowned for his research on the blister agent sulfur mustard, gave the Clarence A. Broomfield Lecture. The title of Papirmeister’s lecture was “From Phage to PARP: My Life in Sulfur Mustard Research and Beyond.”

Retired Col. James S. Ketchum, MD, who was the resident psychiatrist for the Army and was once stationed at Edgewood Arsenal, gave a talk during the conference’s banquet on “Secrets Almost Forgotten.” His talk featured videos clips of experiments on incapacitating agents carried out at the Biomedical Research Laboratory during the 1960s.

During the banquet the Joint Science and Technology Office for Chemical and Biological Defense and the Defense Threat Reduction Agency 2006 Annual Medical Awards were presented. The senior research scientist of the year was Dr. John Petrali of MRICD’s Comparative Pathology Branch, while another individual in

“The Bioscience Review is the premier North American meeting for chemical warfare medical countermeasures and provides an unparalleled opportunity for like-minded scientists to network and collaborate research.”
**—Thomas Sawyer
Canada’s Defence
Research and
Development
Center**

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of improvement occurs during the first week of treatments.

One result of the study will be the creation of altitude preparation guidelines. Muza said USARIEM’s research will develop predictive models to determine rates of decline in physical and cognitive abilities in correlation to how fast Soldiers need to ascend.

In addition to the hypoxia

room treatments, recently completed studies by Muza’s team have determined that a high-carbohydrate diet in high-altitude conditions improves Soldier stamina and appears to reduce AMS. However, taking anti-oxidants or creatine did not lessen the effects of high-altitude exposure. Muza says that future studies will examine several other ways to

lessen the effects of exposure to high-altitude conditions.

The study should be complete by the end of the year.

*—By Jane Benson,
Soldier Systems Center
Public Affairs Office*



People in the News

Detrick officers share family, careers, rank

They share a home, a son and a marriage, and now Kate and Victor Suarez share the same date for their promotions to major.

The captains traded in their silver bars for gold oak leaves during a promotion ceremony at Fort Detrick Aug. 4.

“We’re promoting two exceptional officers, and the Army is now and will be all the better for this event,” said Col. George Korch, commander of the U.S. Army Medical Research Institute of Infectious Diseases, where Maj. Kate Suarez is company commander.

The couple hail from different coasts—he the West, she the East—but met at the Army Medical Department Officer Basic Course. They married in 2001.

“When I talk about Vic ... I realize that one of his greatest accomplishments is he clearly has married well,” said Col. William Fry, commander of the U.S. Army Medical Materiel Agency, where Maj. Victor Suarez works as a logistician. The colonel added that Victor’s deployments to Kosovo and to Iraq as a company commander show that “Vic is one of those who has been there, done that, and not only got the one t-shirt but he’s done a rematch and got the second t-shirt.”

Kate’s commander is equally impressed with her skills. “She is one of those rare officers that has it all: someone who is highly skilled in her professional duties and has the humanity and intelligence to know how to deal with people and has wisdom beyond her years in creating possibility and effecting change,” Korch said.



Alex Suarez, center, helped both his mother, Maj. Kate Suarez, and his father, Victor Suarez, pin on majors' rank Aug. 4.

The actual pinning-on portion of the ceremony saw a mass of family take center stage to change the ranks on the new majors’ berets, shirts and coats. The Suarezes’s son, four-year-old Alex, pinned new rank on his mother and father before the majors put the finishing touches on each others’ uniforms.

Pennsylvania native Kate credited her success to her life philosophy, which she includes

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the branch, Tracey A. Hamilton, was named most promising young researcher. The 2006 outstanding research team award went to MRICD scientists Drs. James F. Dillman III and Robert J. Werrlein for their concerted efforts in identifying therapeutic targets for medical countermeasures against sulfur mustard to enhance the warfighter’s chances of survival on the battlefield.

MRICD’s Dr. David E. Lenz was honored as the outstanding joint research coordinator of the year, and Dr. Chunyang Luo of the Walter Reed Army Institute of Research received the research science contractor of the year award.

Brig. Gen. Patrick Masson of France was recognized with the chemical and biological defense international award for his contribution to furthering cooperative research between the U.S., the University of Nebraska Medical Center, and France.

Maj. Gen. (Ret.) Garrison Rapmund, a former commander of the U.S. Army Medical Research and Materiel Command, complimented MRICD’s staff and commander, Col. Brian Lukey, on an outstanding job.

“I found everything about the meeting first class,” Rapmund said.

—By Dr. Margaret Filbert, USAMRICD



People in the News

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in every e-mail: Live each day as if it were your last. You’ll have no regrets and a wonderful past. “It was the unmissed opportunities that got me to this point and the people who touched my life along the way,” she said.

Her husband’s remarks were light-hearted. He said it was “quite a humbling experience to see that everybody came out to watch Captain Kate Suarez get promoted,” noting that most of the ceremony attendees hailed from USAMRIID.

To friends, families, coworkers and mentors attending the ceremony, the California native said the ceremony reminded him of his wedding day five years ago. “I think we have more people here than were at our actual wedding,” he said. In fact, the Suarezes cut a sheet cake for the ceremony with a replica of a medical staff sword used in the 1840s Kate gave her husband as a wedding gift.

He turned serious when he thanked his in-laws for their support.

“Without Kate’s parents, I don’t know if we could really serve in the military together. When I was deployed and it looked like Kate was going to head out, we had to send our child back to the States,” he said. “It was a very tough time for our military family, and her parents stepped up to the plate and took Alex for us.”

In his benediction, Chaplain (Lt. Col.) Warren Kirby prayed the couple would have “no tensions but sweet communion” between them. Victor already figured out how to accomplish that.

“When the promotion list came out nine months ago, there was a question in the Suarez household of who outranks who,” he said. “Let me settle this right now: for the peace and harmony of my household, there’s a reason I pinned her on first.”



Romano retires

A retirement and retreat ceremony was held July 11 for Col. James Anthony Romano Jr., deputy commander of the U.S. Army Medical Research and Materiel Command, at Fort Detrick’s parade field. Romano served as commander of the USAMRMC for three months in 2005 and retires with more than 28 years of service. Calling Romano a “scientist, statesman and mentor” at the retirement ceremony, Maj. Gen. Eric B. Schoomaker, commander of the USAMRMC, said “no one better represents the value of selfless service than Jim.” During the ceremony Romano received the Legion of Merit for his service.



People in the News



Norway visit

Tom Endrusick, a physical scientist at the U.S. Army Research Institute of Environmental Medicine, shows Norwegian visitors a boot and boot liner worn by their fellow countryman, Rune Gjeldnes, during the first unsupported trek across the Arctic Ocean in 2000. Six Norwegian scientists spent three days at the institute, touring facilities, discussing current research and learning about programs at USARIEM and the Soldier System Center. They also toured the Institute of Soldier Nanotechnology at MIT in Cambridge, Mass.

Employee extraordinaire

Tom Restivo was selected as the U.S. Army Medical Materiel Development Agency's employee of the quarter for the second quarter of 2006.

Restivo was selected for his outstanding performance during USAMMDA's move from its former one-story building into its new three-story converted barracks. During the move, he ensured information technology assets were functional, assisted with equipment packing and preparation for the move.

By planning around network cable locations and power outlets, Restivo helped build a functional and IT-friendly work space. During the entire four-week process, he continued to provide routine helpdesk calls, Web server maintenance, backup tape rotation and monthly patch cycles, maintaining 100 percent compliance throughout the period.

Restivo is the only USAMMDA employee ever to be twice selected for this honor.



Medical Service awards

At the Medical Service Corps Ball at Fort McNair in Washington, D.C., July 8, Capt. Katherine Suarez, top left, of the U.S. Army Medical Research Institute of Infectious Diseases received the National Capital Region Junior Officer Award of Excellence.



James Brammah, bottom left, of the U.S. Army Medical Research and Materiel Command, received the Order of Military Medical Merit.

People in the News



Surgeon general visit

Brig. Gen. Samir A. Hassan, Surgeon General of the Iraq Armed Forces, exchanges gifts with Col. Jonathan Jaffin, deputy commander, U.S. Army Medical Research and Materiel Command, during a visit to the headquarters at Fort Detrick, Md., Aug. 22. A career soldier-physician with training in orthopedics, Samir served in the Iraqi Army under Saddam Hussein and was reportedly one of the first physicians to step forward to enlist in the new Iraqi Army. He was appointed to the rank of colonel and served as the senior medical adviser to the new Iraqi Army under the Coalition Military Assistance Training Team/Coalition Provisional Authority organizations. He was appointed surgeon general in June 2004.

Collaboration award

The Army Research Institute of Environmental Medicine and the Natick Soldier Center won the Collaboration Team Award for the “Nutritionally Optimized First Strike Ration” as part of the competition for the 2006 Research and Development Laboratory of the Year Awards.

“The competition as usual is very close, and it certainly is not an easy task choosing the Army’s best,” wrote Dr. Thomas Killion, deputy assistant secretary research & technology and chief scientist for the Army, in the announcement e-mail sent Sept. 14.

The formal award presentation is set for Oct. 8 at the U.S. Army Acquisition Corps Awards Ceremony.

2006 Research and Development Awards

The U.S. Army Medical Research and Materiel Command received five Army Research and Development Awards for 2006. Award winners will receive an official plaque in recognition of their achievement. Winners are:

- ◆ Col. Beau Freund, U.S. Army Research Institute of Environmental Medicine, for the Warfighter Physiological Status Monitoring Initial Capability project
- ◆ Dr. Juliann G. Kiang, Walter Reed Army Institute of Research, for the effect of heat shock protein project
- ◆ Drs. Jill Sondeen, Michael T. Handrigan

and Michael Dubick, U.S. Army Institute of Surgical Research, and Col. (retired) James L. Atkins and Lt. Col. James D. Oliver III, Walter Reed Army Institute of Research, for their battlefield resuscitation work

- ◆ Dr. John H. McDonough, Dr. Tsung-Ming A. Shih and Dr. Benedict R. Capacio, U.S. Army Medical Research Institute of Chemical Defense, for their treatment of nerve-agent induced seizures project

- ◆ Dr. Frank C. Tortella, Dr. Anthony Williams, Dr. Xi-Chum May Lu, Dr. Jitendra R. Dave, Capt. Jed A Hartings, Maj. Michael L. Rolli and Col. Geoffrey S. F. Ling, Walter Reed Army Institute of Research, for their final characterization of a novel experimental model of penetrating ballistic-like penetrating brain injury project.

Commissioned

Sgt. Dennis Rufolo of the Biophysics and Biomedical Modeling Division at the U.S. Army Research Institute of Environmental Medicine received a direct commission to first lieutenant March 23 as an environmental science officer. Rufolo completed his Master’s in environmental studies from the University of Massachusetts. After he completes Officers Basic Course and Principles of Preventive Medicine, he will be assigned to the 10th Mountain Division, Fort Drum, N.Y., which is scheduled for deployment to Operation Iraqi Freedom later this year.



People in the News



Maultsby

BIG winner

Jerome K. Maultsby was selected for the 2006 Blacks in Government Meritorious Service Award. He is associate director of the office of small business programs for Medical Research and Materiel Command.

The award is presented annually to one civilian and one military member of each military service. This year's award was presented at the BIG 28th Annual National Training Conference in New York Aug. 25.

"I have a passion for what I do," Maultsby said. "I really like being able to provide assistance to people. You don't get any extra money, but there's satisfaction knowing you're helping someone."

Maultsby's job is to help small businesses and minority institutions compete for contracts with MRMC. He gives them information that larger businesses have readily available and ensures all potential contractors have a fair opportunity to succeed.

"I try to educate, encourage and empower small business and academia. That's my goal," he said. "There are a lot of prospective contractors who really want to learn good information on how to cut through the red tape. I've tried to demystify the process and tell people what they need to know, not what they want to hear."

MRMC increased contract awards to small businesses from \$285 million in fiscal year 2004 to \$383 million in FY 05, or about 48 percent of the command's contract awards.

Maultsby also is an advocate for education of minorities. He was instrumental in forming the Maryland Research and Applied Sciences Consortium in 2004. This group consists of representatives from five historically black colleges and minority institutions.

Before going to work for MRMC, Maultsby worked in acquisitions during a 20-year Army career, retiring as a lieutenant colonel in 2001.—*Jerry Harben, U.S. Army Medical Command Public Affairs*



Hunter

BIG contender

Staff Sgt. Melissa Hunter, noncommissioned officer in charge of the Bacteriology Division at the U.S. Army Medical Research Institute of Infectious Diseases, competed against three other military nominees from the Army Medical Department

and won the Blacks in Government Meritorious Service Award for the AMEDD. This is the first year the BIG award competition included nominations from military personnel.

Hunter said she didn't think she would have a chance to win because she was competing against many outstanding individuals.

"I was surprised and very excited to be recognized for my many years of service in the Army and to the mission of USAMRIID," she said of winning.

The BIG service award recognizes military and Department of Defense civilians who contributed significantly to the global war on terrorism through their support of their organization's mission .

Hunter's supervisor, Dr. Patricia Worsham, deputy chief of the Bacteriology Division, has supervised Hunter 11 years, ever since Hunter entered the Army in 1994. "Her leadership, maturity, productivity and technical abilities have made her an invaluable resource in our mission to protect the warfighter against biological threats," she said.

Hunter's support of the global war on terror includes helping to process the more than 10,000 samples USAMRIID has received because of bioterror threats or events. She also is one of a handful of USAMRIID scientists the FBI has allowed to analyze their forensic samples.

"She was chosen for this work not only for her laboratory skills," Worsham said, "but also for her integrity, strength of character and her ability to deal with sensitive materials and information."



People in the News



Army visit

Dr. Francis J. Harvey, Secretary of the Army, peers into a biosafety level 4 suite at the U.S. Army Medical Research Institute of Infectious Diseases during a visit to Fort Detrick June 30. Harvey, who earned a doctorate in metallurgy and material sciences from the University of Pennsylvania, visited laboratories on Fort Detrick and received an overview of the U.S. Army Medical Research and Materiel Command.

Promotions

Sgt. Dan Catrambone, U.S. Army Research Institute of Environmental Medicine
Sgt. Sarah Elliott, USARIEM
Sgt. Eric Lloyd, USARIEM
Sgt. Hipolito Ramos, USARIEM

Re-enlistments

◆ U.S. Army Medical Research Institute of Infectious Diseases
Spc. David Edward Flowers
Spc. Uriel Gastelum
Spc. Timothy John Mohan
◆ U.S. Army Research Institute of Environmental Medicine
Spc. Hipolito Ramos
Spc. Dan Catrambone
Sgt. Guy Cipolla
Spc. Candace Jones
Sgt. Andrew Coggins
◆ Walter Reed Army Institute of Research
Spc. Jean Lorain Jerome
Spc. Lisa March Price
Staff Sgt. Victoria Diane Chapman
Sgt. Andre Eugene Battles
Sgt. Leslie Anne Ash
Spc. Jean Lorain Jerome



New commanders

Col. Beau Freund, left, became commander of the U.S. Army Research Institute of Environmental Medicine during a ceremony hosted by Maj. Gen. Eric Schoomaker, center, Sept. 11. He replaces Col. Karl Friedl, right, who takes command of the Telemedicine and Advanced Technology Research Center Oct. 12.

Gold medalists

U.S. Army Research Institute of Environmental Medicine's Sgt. Eric Lloyd and Sgt. Sarah Elliott earned gold medals in the German Armed Forces Proficiency Competition.





Medal presented

Col. Kenneth Bertram, commander of the Walter Reed Army Institute of Research presented the Army Commendation Medal to Maj. Christophe N. Peyrefitte, French military liaison to the Department of Molecular Pathology, July 7. The major received the medal for his work on Chikungunya virus, staphylococcal enterotoxin B and dengue.

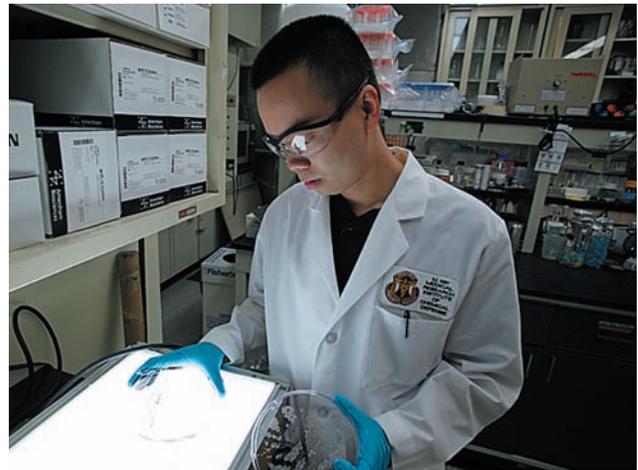
MRICD intern attends prestigious conference

David Yeung, an Oak Ridge Institute of Science and Education Program intern at the U.S. Army Medical Research Institute of Chemical Defense and a University of Maryland graduate student, was among 60 top young researchers from U.S. academic and government laboratories selected to attend The Lindau Conference, in Lindau, Germany. The meeting was held June 25-30.

Since 1951, the conference has provided about 200 graduate students and young researchers, chosen from an international pool of more than 11,000 nominees, to meet both formally and informally with Nobel laureates in chemistry, physics and physiology/medicine. U.S. participants are selected by the U.S. Department of Energy, the National Science Foundation, the National Institutes of Health, the U.S. Army and Oak Ridge-associated universities. The students gathered in Washington, D.C., June 23 for an orientation meeting at DOE's headquarters before embarking on their travel to Lindau.

Yeung is conducting his dissertation research at the institute, investigating ways to engineer bioscavenger pretreatments against exposure to chemical warfare agents and has authored two peer-reviewed scientific journal articles on his work.

Yeung said the most noteworthy experience of the trip was to see that the laureates are real people who are truly passionate about the work that they do, and that they are in many ways no different from the students sitting in the audi-



Yeung

ence. The conference was an environment that enabled Yeung to interact with other American and foreign graduate students from a wide variety of scientific backgrounds.

“The trip as a whole really opened my eyes to what advantages we have in the U.S.—funding, opportunities and choices in research topics,” he said. “The whole experience gave me a new perspective on American science, which I will hold onto as I continue my career. I truly feel lucky to have had this once-in-a-lifetime experience.”

—Dr Douglas Cerasoli and Cindy Kronman, USAMRICD





Kenya visitor

Illinois Senator Barack Obama visited the Malaria Vaccine Initiative-financed and U.S. Army Medical Research Unit-Kenya-operated Kondelli Research Building in August. Standing to his right is Dr. Bernhards Ogutu, principal investigator for the recent vaccine trial of the Walter Reed Army Institute of Research's FMP1 malaria vaccine.

MRICD scientist receives honorary degree

A senior principal investigator at the U.S. Army Medical Research Institute of Chemical Defense, Dr. John P. Petralli, was honored by his alma mater, Davis and Elkins College, Elkins, W. Va., at the college's public commencement ceremony May 14. The Trustee and Honors Committee of the college recognized Petralli with an honorary doctor of science degree.

Petralli was touched by the recognition.

"On behalf of all D&E Alumni I will serve and wear this honor proudly and with privilege," he said, addressing the graduates.

Through its 100-year existence, Petralli said, the contributions the small school has made to society have been inversely proportional to its size. D&E graduates have advanced clinical medicine, laboratory medicine, surgery, medical research, molecular sciences, pharmaceuticals, philosophy, religion, chemistry, the theater, civil government, legal government, art, business, and politics among other disciplines.

"That is a record of which you may well be proud, Petralli said. "You are now poised to join this select company. So, be a proud D&E graduate. Provide the world what is expected of a well educated, responsible and compassionate leader.



Dr John P. Petralli receives his Doctor of Science hood from Dr. Lawrence McArthur, dean of the faculty, right, and Dr. Leonard J. Timms, chairman, Board of Trustees, while Davis and Elkins College president, Dr. G. Thomas Mann, introduces him. (Photo courtesy of Dr. John P. Petralli)

The world will find time to reward you for it."

Davis and Elkins college chose to honor Petralli, who graduated cum laude from the college in 1955, for "his distinguished career as a research scientist in the cause of human health and the protection of life in the face of potential chemical and biological attacks."

—Cindy Kronman, USAMRICD

