

MEDIA 2014



2014

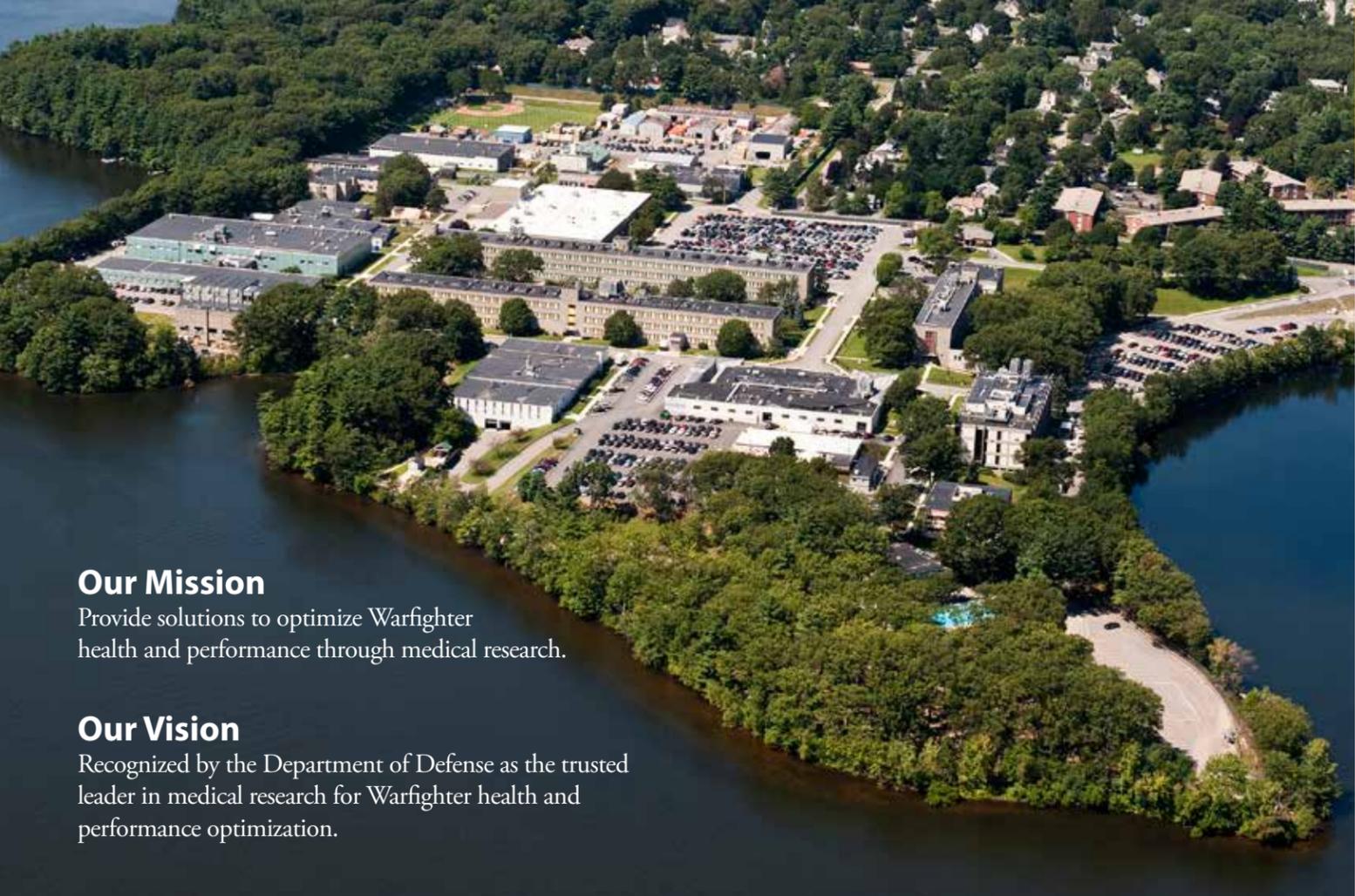


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Our Mission

Provide solutions to optimize Warfighter health and performance through medical research.

Our Vision

Recognized by the Department of Defense as the trusted leader in medical research for Warfighter health and performance optimization.

USARIEM is co-located at the Soldier Systems Center in Natick, Massachusetts. A short distance from Boston, the institute offers researchers its own unique facilities and is in close proximity to many of the finest universities.

- Hypobaric Chambers (9,000m, -15°C to 40°C)
- Environmental Chambers (-10°C to 50°C)
- Water Immersion Laboratory (5°C to 45°C)
- Biomechanical Laboratory
- Human Exercise Physiology Laboratories
- Laser and Flow Cytometer Laboratory
- Pikes Peak Research Facility (4,300m)
- USARIEM / Womack Medical Research Facility
- Metabolic Kitchen
- Body Composition Laboratory

History

Recognizing the importance of environmental and operational contingencies for the health, performance and effectiveness of troops in training or combat, USARIEM was activated on July 1, 1961 in Natick, Massachusetts as a research laboratory under the U.S. Army Medical Research & Development Command (now called the U.S. Army Medical Research & Materiel Command).

The Institute was created from a composite of elements associated with a number of outstanding federal and academic laboratories,

including the Harvard Fatigue Laboratory in Cambridge, Massachusetts, the Armored Medical Research Laboratory at Fort Knox, Kentucky, the Climatic Research Laboratory in Lawrence, Massachusetts and the Quartermaster's Environmental Protection Research Division and Earth Sciences Division at Natick.

Key Products

Performance Optimization Doctrine: USARIEM produces training policy and guidelines that provide recommendations to enhance Warfighter capabilities and reduce health risks.

Preventive Medicine & Planning Doctrine: USARIEM produces preventive medicine guidelines to minimize Warfighter injuries and lost duty time and medical costs.

Materiel Development Support: USARIEM recommends product improvements for clothing, equipment, nutrition and pharmaceuticals by providing design specifications to improve individual Warfighter equipment and rations.

Monitoring Strategies & Predictive Algorithms: USARIEM has developed strategies for personal status monitoring and a variety of algorithms to prevent and detect Warfighter performance decrements.

Health Hazard Assessment: USARIEM coordinates with the Center for Health Promotion and Preventive Medicine (CHPPM) for thermal and hypoxic conditions.

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Natick tests lightweight, body-worn system

Helping Aircrews Keep Their Cool

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass. (May 29, 2014)

For years, helicopter pilots have kept cool by plugging into aircraft-mounted microclimate cooling systems, but their crews have used them less frequently to avoid becoming entangled in the tethers that connected them to the systems.

That's why researchers at the Natick Soldier Systems Center have been testing the "Light-Weight Environmental Control System," or LW ECS, a body-worn microclimate cooling system that allows crew members to move around inside the aircraft without tripping on tethers, and to exit the aircraft while still being cooled.

"Basically, it's a small refrigeration device," said Brad Laprise, a mechanical engineer with the Warfighter Directorate, Natick Soldier Research, Development and Engineering Center, or NSRDEC. "It's the same technology that's in your air conditioner or in your refrigerator, except instead of conditioning air, it chills a fluid. And then it pumps that fluid through a tube-lined cooling vest."

The cooling unit is a cylinder 3 1/2 inches around that connects to a cooling vest and provides 120 watts of cooling. The vest has approximately 110 feet of tubing through which fluid can pass, and it is worn against a Soldier's skin. The system is powered by a plate-like conformal battery that can fit inside body armor.

"So we're hoping that this small, lighter-weight system would give them a lot more autonomy in the rear of the aircraft," said Laprise, "and to allow them to get the cooling when they need it."

Researchers from NSRDEC and the U.S. Army Research Institute of Environmental Medicine, or USARIEM, working with Product Manager Air Warrior, have been

testing LW ECS at Natick's Doriot Climatic Chambers. With the assistance of volunteers wearing MOPP 4 chemical-protective gear, they have been simulating 11-hour missions in desert and jungle conditions.

"We've been living in the desert for the last 20 years, but we also know that the Pacific Rim is the next area that we're looking at," said Bruce Cadarette, a research physiologist with USARIEM's Thermal and Mountain Medicine Division. "We've been providing microclimate cooling for the pilots ... for 16 years now. It made them be able to prolong their mission, their endurance time, and able to perform at a higher level."

The hope is that their crews will be able to realize similar benefits with LW ECS, without being tethered to an aircraft-mounted system.

"Right now we're looking at crew chiefs that have to load and unload cargo and maintain the cargo," Cadarette said. "They also have to sit as rear gunners in some of the helicopter frames."

"The other people that we're concentrating on ... are the medics, who have to fly out in the back of the helicopters and who have to go out and treat wounded in the field, load them onto stretchers, (and) get them onto the back of the helicopter."

Over two weeks, the five test subjects each took two turns in the simulated desert conditions and a pair in the jungle conditions – one using the cooling system and one without it – in the chamber.

"It's really a critical step, ... proving out the efficacy of this microclimate cooling technology and the capability that it provides," Laprise said. "If we don't have Doriot, we need to find somewhere else to do it, and I'm not

so sure there's a place in the world where we can do this testing. So it is absolutely critical that we have this capability here at Natick."

The cooling systems and the volunteers performed well, according to the researchers.

"We really haven't had any issues with (the LW ECS)," said Laprise, who looked at the fluid temperature before and after it passed through the system, and monitored flow rate. "By and large, they've been very reliable."

Cadarette said the same for the volunteers, who sat for 50 minutes and walked for 10 minutes each hour to simulate missions during which they would get off and back on the aircraft.

"A lot of the day is not heavy work, but for brief periods of time, they work very, very hard," Cadarette said. "Now you've got a battle between your muscles calling for blood in order to exercise and your skin calling for blood in order to cool off."

During the 11-hour sessions, Cadarette and his team monitored core and skin temperature, heart rate, and everything that went into or came out of the subjects' bodies.

"From our point of view, we monitor everything we can, physiologically," Cadarette said. "So now we know, are you doing better with the cooling?"

Cadarette has a great deal of data to sift through, but the early indications are that the LW ECS is making a difference.

"Physiologically, we're seeing that their body core temperatures are lower, their heart rates are lower," Cadarette said. "So far, what I'm seeing looks really good. I think we can show that the cooling portion of this does what we're asking of it."

Volunteers wear MOPP 4 gear during testing of a body-worn microclimate cooling system for the helicopter aircrew members in Doriot Climatic Chambers.



Working Up a 'SWET'

USARIEM app helps determine body's water needs

By Kelly Field, USARIEM Public Affairs / NATICK, Mass. (Oct. 24, 2014)

Clean, potable water is one thing the world universally cannot live without. It hydrates. It cleans. It keeps us alive and well. No doubt, water is very valuable to Soldiers.

However, as many mission planners know, water planning can be a nightmare. Too much water can strain already heavy combat loads, perhaps forcing some Soldiers to pack too little in favor of a lighter pack. When Soldiers don't have enough water, dehydration could set in, decreasing performance and increasing the risk of serious heat illnesses.

"Water is a huge logistical problem for training and field missions," said Dr. Nisha Charkoudian, a research physiologist from the U.S. Army Research Institute of Environmental Medicine, known as USARIEM, Thermal and Mountain Medicine Division. "Obviously, planners do not want too much, but having too little can lead to serious problems. Dehydration exacerbates symptoms caused by heat and altitude exposure, and makes a lot of things worse, including the ability to perform physical tasks in hot and high-altitude environments."

To help solve this logistical problem, Charkoudian worked with researchers from USARIEM — Dr. Sam Cheuvront, Dr. Robert Kenefick and Ms. Laurie Blanchard — and a team from the Massachusetts Institute of Technology Lincoln Laboratory — Dr. Anthony Lapadula, Dr. Albert Swiston and Mr. Tajesh Patel — to develop an app that will help unit leaders accurately predict water needs with the goal of minimizing the burden of water transport and sustaining hydration.

"Research into heat stress has been going on for over 50 years at USARIEM," Charkoudian said. "We have been providing guidance to the Department of Defense about sweat loss and hydration, and refining it for many years through TB MED 507. Paper doctrine provides generalized look-up tables generated from complicated equations. The app meets requests from the increasingly digital battlefield for paperless guidance that is simple, accurate, mission-specific and available in real time."

Called the Soldier Water Estimation Tool, or SWET, this Android-based smartphone app is a decision aid that translates a complicated biophysical and physiological sweat prediction model into simple user inputs re

freeguarding the anticipated intensity of activity (low, medium, high, including example activities), three category choices of military clothing ensemble and weather conditions (air temperature, relative humidity and cloud cover).

The SWET app has user-friendly inputs and provides the user with the amount of water required for the specified conditions in liters per hour. A separate "Mission Calculator" tab further simplifies planning by providing total amounts of water required for a given unit (number of people) for a given mission duration (total time, in hours). Total water amounts are provided in liters, one-quart canteens, two-quart canteens and gallons.

Charkoudian said this app was designed for unit leaders to determine group water needs.

The average amount of water needed per person does not reflect individual differences, but the model error for individuals is estimated to be small. Soldiers should expect to see this app within the year on the Army's Nett Warrior platform.

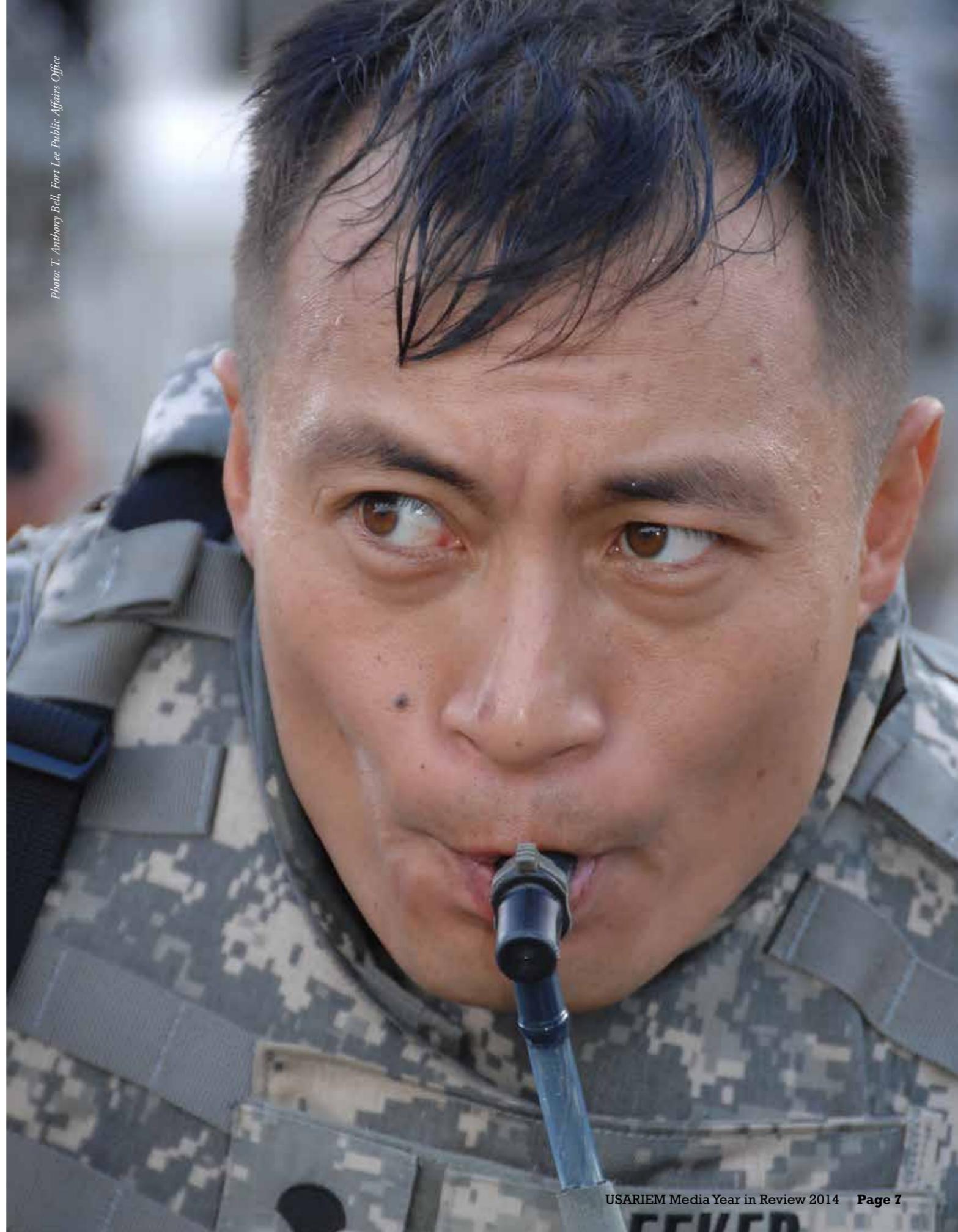
"This will be one of the first apps rolled out in the Nett Warrior platform," Charkoudian said. "I am so excited to be doing stuff that is directly helping Soldiers in the field. I think that's just so cool."

In the meantime, Charkoudian said that the app has already undergone limited user testing with the Army Mountain Warfare School in Jericho, Vermont, where Soldiers gave very positive feedback. She is looking forward to more feedback once the app goes live, to make updates and possibly explore its uses in the commercial world.

"There is the potential here for future versions of SWET for sports and sports drink companies, for team sports, as well as for humanitarian and disaster-relief organizations," Charkoudian said. "People want apps; that's what they are excited about. It's something everyone can relate to."

Spc. Heyz Seeker gets a drink from a hydration device during the Urban Warfare Orienteering Course event of the Department of the Army Best Warrior Competition at Fort Lee, Va., Oct. 1-5.

Photo: T. Anthony Bell, Fort Lee Public Affairs Office





"Blitz" and officers from the Plymouth County Sheriff's Department recently came to the U.S. Army Research Institute of Environmental Medicine to meet with scientists from USARIEM and MIT Lincoln Laboratories, who are involved with the program to evaluate thermal stress in Military Working Dogs, which is led by Kate O'Brien, a research physiologist with USARIEM, pictured with Blitz.

Last summer, Ken Ballinger, a K-9 officer with the Plymouth County Sheriff's Department, was conducting a training session with working dogs on a hot and humid New England day.

For safety, Ballinger had arranged for two veterinarians and three paramedics to be on site. When the dogs were not working, they were resting in air-conditioned vehicles and checked on every 15 minutes. On one of these routine checks, Ballinger's dog, "Blitz," a 3-year-old Shepherd, did not respond.

The vehicle had failed, so that instead of blowing cool air, 200-degree engine air flowed into the cabin where Blitz was. Blitz was unconscious when he was pulled from the vehicle. Emergency treatment began immediately, including application of ice packs, administration of intravenous fluids and rapid transport to Angell Animal Medical Center, located only five minutes away.

An hour later, Blitz's core temperature was still 109 degrees, far above normal; yet within two weeks he was back to work. In the veterinary community, this was the highest temperature documented with survival.

"Heat stress is a significant concern for military working dogs, both during training and deployment," said Kate O'Brien, a research physiologist at the U.S. Army Research Institute of Environmental Medicine in Natick, Mass. "If heat illness occurs, even if it is not fatal, MWDs are often retired from service, resulting in loss of a valuable resource that is costly with respect to both time and money."

USARIEM's Biophysics and Biomedical Modeling Division is working with the Massachusetts Institute of Technology's Lincoln Laboratory to solve this problem through a program to examine thermal stress in military working dogs.

"Real-time physiological monitoring can be used in humans to identify individuals who are at risk of excessive heat strain," said O'Brien.

For example, O'Brien said, Weapons of Mass Destruction Civil Support Teams have used handheld "buddy" displays to see when an individual is becoming too hot and could use that information for better mission management.

"A similar approach could be used with MWDs to send information to the handler when the dog is overheating," O'Brien said. "The handler could then take action to both avoid performance degradation and reduce risk of heat illness."

O'Brien said that while heat illness occurs less often in civil working dog populations, sometimes things happen despite your best efforts to prevent it.

A few months later, Blitz had an implanted temperature sensor in his chest. Data is transmitted so that handlers can monitor Blitz's temperature in real-time, as well as be alerted if he reaches a critical preset threshold temperature.

"It may not be feasible to surgically implant every MWD with a temperature sensor," O'Brien said. "However, USARIEM has demonstrated in humans that heat tolerance can be tracked in real-time using data obtained from non-invasive physiological measurements in combination with algorithms and models that predict core temperature."

This capability for monitoring humans was developed through USARIEM's expertise in thermal physiology, biophysics and mathematical modeling. Expertise from MIT Lincoln Laboratory in signal processing, data storage and microprocessing contributed to the methodology for transmitting this

"USARIEM has demonstrated in humans that heat tolerance can be tracked in real-time using data obtained from non-invasive physiological measurements in combination with algorithms and models that predict core temperature."

**Kate O'Brien,
research physiologist, USARIEM**

By Kelly Field, USARIEM Public Affairs / NATICK, Mass. (Jan. 31, 2014)

Working Dogs

**USARIEM
studying how to
cool K-9s**

information to the individual. Together, USARIEM and MIT Lincoln Labs are currently working on a very low power, size and weight physiological status monitoring system for humans. This same approach is being applied to monitoring heat strain in MWDs.

"Through partnerships with the MWD community, local police K-9 units, and MIT Lincoln Labs, USARIEM will be developing products and strategies to reduce heat injuries and sustain performance in working dogs for military and law enforcement," O'Brien said.



At a time when running barefoot or with so-called minimalist shoes has gained increasing traction, researchers at the U.S. Army Research Institute of Environmental Medicine decided to study how Soldiers run during physical training and if running style contributes to training-related injuries.

“Running as part of physical training, for a long time, has been implicated as a source of injury in the Army,” said Maj. Bradley Warr, deputy chief of the Military Performance Division at USARIEM. “(If) teaching people how to run differently could potentially mitigate those injuries, there would be a huge payoff.”

As Warr pointed out, most people land on their heels first as they run. Going barefoot or wearing minimalist shoes allegedly forces them to make contact on the midfoot or forefoot.

“Proponents of these alternative styles say that running in a way other than (heel) strike will prevent you from getting injured, and you can run faster,” Warr said. “That’s really the background of ... this study.

“Eighty-five percent of people run with a heel strike naturally. And then the other 15 percent run with a midfoot or a forefoot strike. So we decided to compare injuries between runners who already run with these different styles.”

Nearly two years ago, Warr and Dr. Joseph Seay, a biomechanist with the Military Performance Division, began studying Soldiers’ running styles to see if they affected performance

or the likelihood of injury. Initially, they looked at 341 members of the 1st Battalion, 66th Armor Regiment at Fort Carson, Colo., to see how they compared to the general population.

“Nothing like that’s (been) done before,” Warr said. “Before we would implement new policy or training, we have to really evaluate (if) that really makes a difference in injury profiles amongst runners or Soldiers, in

particular, because runners and Soldiers aren’t necessarily the same thing.”

Seay said he liked this study because it was basic.

“Really, the study is less about what is or is not worn on your feet than it is about how your foot hits the ground and how that relates to getting injured,” Seay said. “You’re getting to something that’s very relevant, that everybody can understand.”

Warr and Seay, runners themselves, filmed and analyzed the foot-strike patterns of participants and had the Soldiers complete surveys about potential running-related injuries, training history, and 2-mile run times. They presented their results at last spring’s American College of Sports Medicine annual meeting.

“As far as we’re concerned, there does not seem to be a benefit to modifying Soldiers’ running style,” said Warr, adding that there was no statistical difference between running styles when it came to 2-mile run times or the number of injuries. “If it’s not broke, don’t fix it, is essentially our perspective at this point, I would say.”

“Neither group was faster,” Seay said. “Neither group got injured less frequently. A finding of no difference is still important information to report; we’re just documenting that there might not be a magic bullet.”

Warr and Seay did point out that other studies have indicated that a change in running style might be warranted for Soldiers with such injuries as anterior compartment syndrome.

“There is some research that has shown that retraining those people to run with a different technique – maybe more forefoot, instead of heel striking – relieves shin pain,” Warr said.

“It relieves their pain, and it measurably relieves pressure in the anterior compartment,” Seay added.

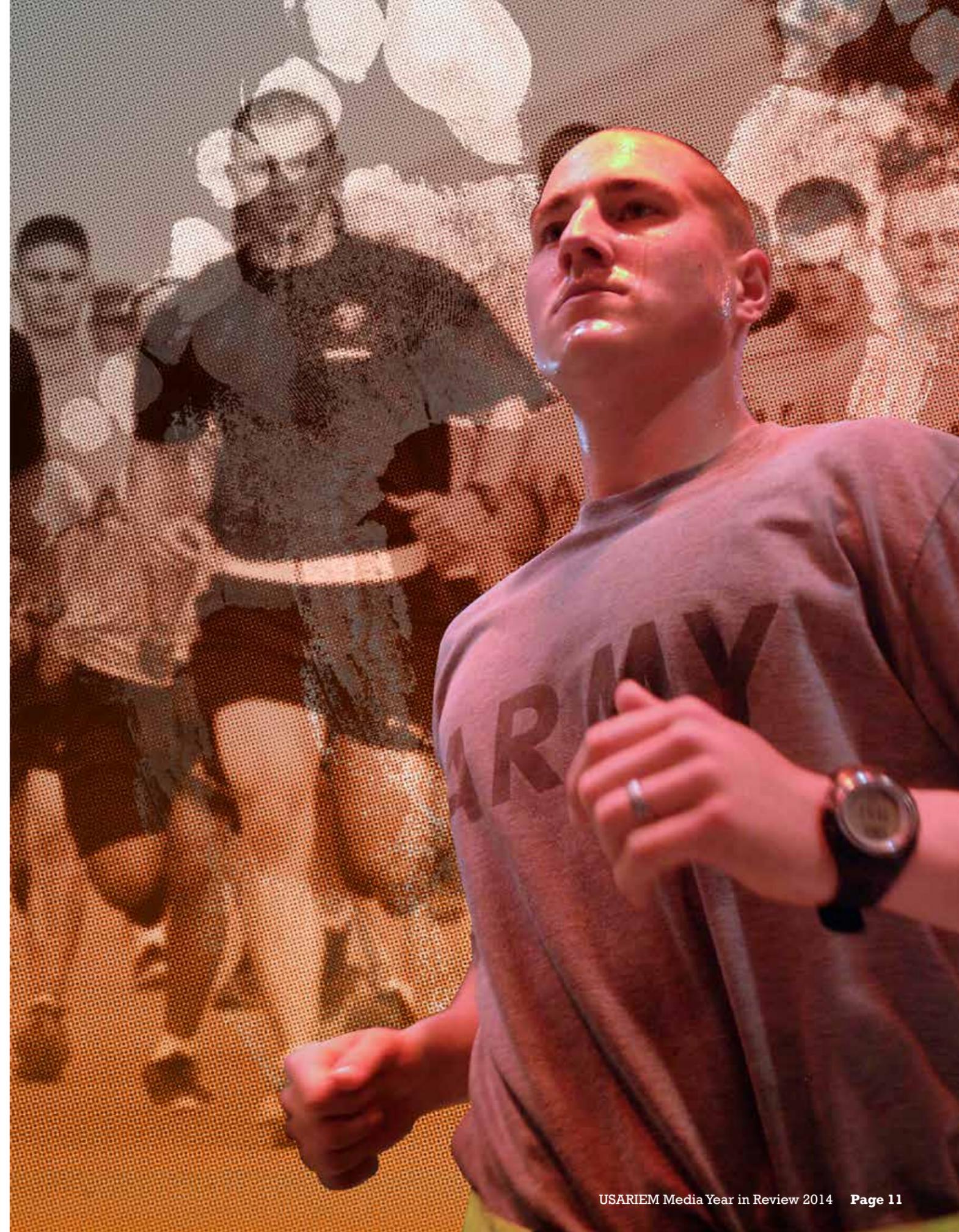
Warr and Seay are far from done with their own study. Data have been collected on a group of more than 1,000 Soldiers to allow for comparisons between men and women, and traditional and minimalist running shoes.

“It’s very relevant right now,” said Warr of the study. “You could talk to anybody about it (who) has any interest in fitness or running — they want to know what we’re doing with this.”

Hoofin’ It

USARIEM researchers study Soldiers’ running styles

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass. (March 14, 2014)





USARIEM

seeks to improve bone health

Army and Air Force conduct joint study

By Kelly Sullivan, USARIEM / NATICK, Mass. (Jan. 6, 2013)

Researchers from the U.S. Army Research Institute of Environmental Medicine have teamed up with the Trainee Health Surveillance Flight 559th Medical Group's Basic Military Training Team at Joint Base San Antonio-Lackland, Texas, to determine whether increased vitamin D and calcium intake can improve bone health in military personnel.

Stress fractures and musculoskeletal injuries are among the leading causes of medical holdovers during basic military training, and often lead to attrition of military personnel early in their careers. As many as five percent of males and 20 percent of females may develop some sort of stress fracture during military training due to the novice warriors' inability to withstand unaccustomed, repeated stress to their bodies, such as marching with body armor.

"Optimizing bone health of military personnel is essential, especially during Basic Military Training and other military training activities," explained Dr. James McClung, a nutritional biochemist with USARIEM's Military Nutrition Division. "These injuries are costly to warfighters and to the military, as a significant portion of individuals that suffer from stress fracture leave military service and stress fracture results in substantial health care costs associated with treatment and rehabilitation."

Recent studies have linked vitamin D and calcium to bone health and the prevention of stress fractures. In a 2008 study conducted by Creighton University, in conjunction with the Navy, more than 5,000 female recruits underwent a trial in which they consumed either a supplement containing vitamin D and calcium or a placebo over the eight weeks of Navy boot camp.

During the course of that study, 270 stress fractures were observed in the placebo group, but only 226 stress fractures were observed in the group receiving the vitamin D and calcium supplement. Advanced analysis showed that vitamin D and calcium supplementation may have reduced the risk of stress fracture by up to 20 percent.

"We say 'may have reduced the risk' because missing from that study were biochemical indicators of nutritional health or functional indicators of bone health," McClung said. "There were just not enough data to use this study as the sole basis for implementing policy changes affecting vitamin D and calcium levels in the warfighter diet."

So, McClung and his team of researchers, managed by Dr. Erin Gaffney-Stomberg, a research fellow within the division, set out to explore the biochemical and functional basis for these findings, with the goal of providing Army and Air Force personnel with levels of vitamin D and calcium consistent with the Navy study. After conducting an initial study with the Army in 2012, McClung partnered with the team at JBSA-Lackland in October 2013, for more research.

Air Force recruits, both male and female, participated in a trial similar to the Navy study, but this time they were given a snack bar either fortified with vitamin D and calcium that was developed in collaboration with scientists from the Department of Defense Combat Feeding Directorate at the Natick Soldier Research, Development and Engineering Center, in Natick, Mass., or a placebo snack bar.

"Optimizing bone health of military personnel is essential, especially during Basic Military Training and other military training activities."

Dr. James McClung, a nutritional biochemist with USARIEM's Military Nutrition Division

McClung's team of researchers collected physiological data from Airmen twice during their training, on day three of their reception phase of training and again immediately prior to graduation. Techniques included body composition assessment (using military standards), blood collection, a bone scan using a device called a peripheral quantitative computed tomography, and paper surveys. This round of collected data was sent to USARIEM's headquarters in Natick, Mass., as well Pennington Biomedical Research Institute, Baton Rouge, La., for assessment.

According to McClung, they had close to a 90 percent rate of compliance from Airmen in this study.

"We have had great support from everyone at Lackland for this study, from the leadership to the recruits," McClung said. "This is important because we have extended the scope of our knowledge beyond the Army, and we now have the basis to extend nutrition recommendations to the Air Force based upon data collected directly from their personnel."

The leadership at Lackland agrees that this collaboration is valuable and could not have been conducted in partnership with any other organization.

"As I reviewed the military literature on stress fractures and prevention, it was clear that Doctor McClung and the USARIEM team were the only assets in DoD who had published on nutrition and impacts on military training," said Thomas Leo Cropper, director of Trainee Health Surveillance Flight 559th Medical Group at Lackland. "We consulted them to gain access to the latest military science knowledge on nutrition and military performance to improve military training outcomes."

According to Cropper, stress fractures are costly because they can require multiple doctor visits and medical tests such as X-rays or MRIs, plus physical therapy, which can cost the Air Force more than \$6,000 per case. Added to that, trainees miss weeks to months of expensive military training while they wait to heal in medical hold and then exercise to regain fitness to meet military physical training standards required to graduate.

"Many trainees get demoralized after a stress fracture and quit," Cropper said. "If we can prevent stress fractures or other injuries, it is much better for all concerned."

McClung and his team plan to return to Lackland in spring 2014, to continue testing in the hopes of preventing future injuries. At the completion of the study, scientists from USARIEM will share those data with senior leaders from the DoD's medical and training commands in an effort to determine whether providing vitamin D and calcium beyond the current recommended daily allowance may be beneficial for the optimization of bone health during military training.

"Military personnel represent a unique population faced with sometimes intense physical demands," McClung said. "Our goal is that findings from these studies will provide the information necessary to determine the optimal vitamin D and calcium requirement of military personnel for the maintenance of bone health and prevention of stress fractures to keep warfighters mission ready for the long haul."

'Maj. Clo' sweats it out at Doriot Climatic Chamber

1 Feeling the heat at Natick

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass. (Jan. 15, 2014)

If he's a bit of a hot head these days, you'll have to excuse him. "Maj. Clo" is just doing his job.

Lately, he's literally been feeling the heat at work, because Maj. Clo is the thermal test manikin at the U.S. Army Research Institute of Environmental Medicine.

Maj. Clo has been getting a real grilling recently as USARIEM researchers placed him under solar lamps at the Doriot Climatic Chambers of the Natick Soldier Research, Development and Engineering Center in an effort to measure the thermal burdens of different-colored garments.

"Different materials absorb different amounts of solar radiation," said Tony Karis, a research physical scientist at USARIEM, "and this testing will help us quantify how much solar radiation is being absorbed."

Doriot's Tropic Chamber became just the place to do that in January 2013, when it was outfitted with a Solar Simulation Unit

that brought daylight conditions indoors. The 18 1,500-watt metal halide vapor lamps, arranged in three rows of six apiece, allow Doriot to produce artificial sunlight that replicates different climates in every season at various times of day — in the mountains, desert and everywhere in between.

"All of the tests in the past that we've done for 50 years in this facility have been without sun," said Josh Bulotsky, Doriot's manager. "This is like real sunlight. You don't realize how really hot it is."

It was only a matter of time before Maj. Clo and his 5-foot-9-inch carbon fiber, epoxy resin and copper frame, featuring 200 sen-

sors and simulated sweat pores, would be deployed there.

"There (are) not too many places that have these solar lamps that we can actually use a full-size manikin," Karis said. "A lot of times, it's done on a smaller scale. To be able to use a full-size manikin in an operational room is something that — as far as I know — no other place is doing."

Karis explained that USARIEM researchers are measuring how much heat is being transmitted from the clothing to Maj. Clo.

"Another thing that complicates this is the coverage," Karis said. "As coverage changes, the absorbtivity changes, too. Short-sleeve shirt versus long-sleeve shirt, shorts versus long pants — each one of them, there's different coverage, so there are different thermal burdens to each ensemble."

Karis and his USARIEM colleagues have placed Maj. Clo in the chamber at 80 degrees and 50 percent relative humidity with a 3.5 mph breeze. Then they have hit him with either 1,000 or 500 watts of solar load.

"A thousand watts is a good choice for the highest value in most locations during the summer, but more extreme conditions may occur," Karis said. "We also did 500 watts, which may be a more representative value for conditions between late morning and early afternoon for the warmer part of the year."

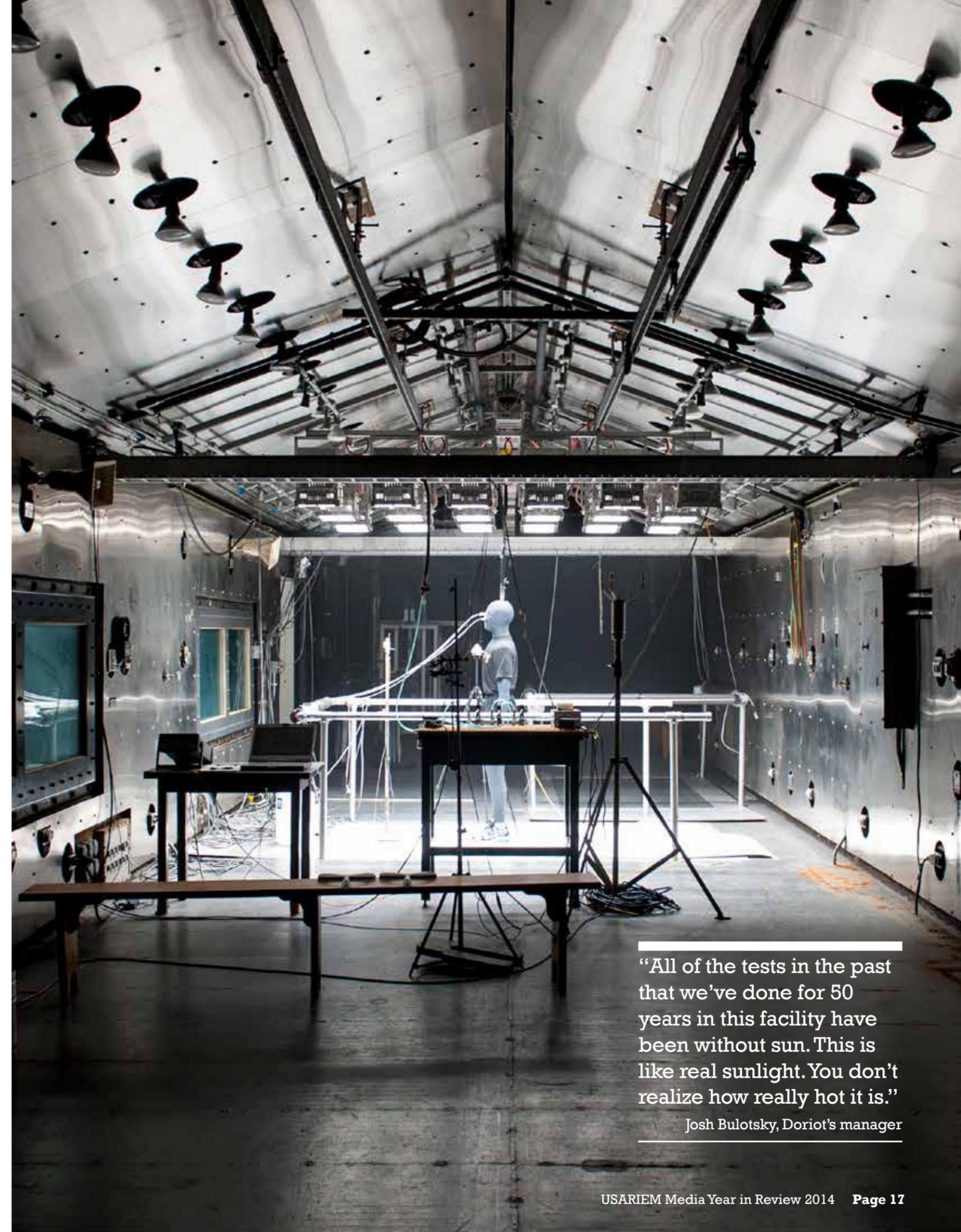
"The manikin measures heating over different parts of the body, and the heating just due to solar loading can vary widely for different parts of the body. But that's the idea — to monitor and measure the solar load on different garments and its effects on different parts of the body."

This validates models that USARIEM already has.

"It's nice to be reassured that your models are predicting correctly," Karis said. "We will use this information to make our models more robust."

Karis said USARIEM had done about a dozen tests with another half-dozen remaining. One day, the data could have real-world applications.

"The battlefield has changed from a jungle battlefield or woodland," Karis said. "Now we're in open desert or mountain regions where there's very little overhead coverage from plant life. So now you're in direct sunlight for the majority of the time."



"All of the tests in the past that we've done for 50 years in this facility have been without sun. This is like real sunlight. You don't realize how really hot it is."

Josh Bulotsky, Doriot's manager

Sleepless in Natick

Study examines stress, Soldiers' immune systems

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass. (March 21, 2014)

Training and operations can put such tremendous physical and psychological stresses on warfighters that their immune systems may be compromised.

A study being conducted by the U.S. Army Research Institute of Environmental Medicine at Natick Soldier Systems Center will examine how sleep restriction — the stressor — affects wound healing and whether nutritional supplements can help offset the effects. In a sub-study, the effect of sleep restriction on friend-foe recognition during marksmanship is also being observed.

“Immune responsiveness is suppressed in warfighters exposed to physical and psychological stress,” said Tracey Smith, Ph.D., a research dietitian with USARIEM’s Military Nutrition Division, who used Ranger School and Special Forces Assessment School as examples. “Research has shown that modest improvement in immune responsiveness, as determined from blood markers, was noted when Soldiers were provided a nutritionally fortified energy bar during Special Forces Assessment School.”

Smith said the Special Forces research didn’t focus on whether nutrition helped wounds to heal or defend against a virus, however.

“Immune markers measured from blood samples provide an indication of systemic immune response,” said Smith, “but the systemic immune response does not necessarily reflect the functional status of the immune system — for example, wound healing time.”

In the study, male and female Soldiers were given suction blisters on their forearms. Some volunteers slept at least seven hours per night, and the current group is undergoing 50 hours of sleep restriction, with Soldiers allowed just two hours of sleep per night over that period.

“This was the amount of time that we thought would cause decrements in healing time and immune responsiveness at the wound site in young adults,” Smith said. “This model may provide a way to more effectively study effects of stress on wound healing, and a means to test prototype countermeasures, like nutrition interventions, to stress-related effects on healing.”

“We are using the suction blister model as a tool for studying immune responsiveness of warfighters coping with stress, and nutrition interventions to mitigate decrements in immune responsiveness caused by stress.”

Capt. Adam Cooper, Ph.D., a research psychologist at USARIEM, piggybacked his marksmanship research on Smith’s study.

“We are interested in how sleep restriction differentially affects marksmanship performance during a simple versus mentally challenging friend-foe task,” Cooper said. “The factors we are examining are reaction time, accuracy and correct decision.”

“Once it is known what factors are affected during low versus high mentally demanding marksmanship tasks, leaders can make

more informed decisions concerning what types of missions their Soldiers will be able to successfully complete given their current state of rest.”

Smith said that the marksmanship “keeps the volunteers awake, engaged and, hopefully, adds to the sleep restriction stressor.”

The USARIEM study is using 60 volunteer Soldiers, split into groups of four per session. Smith and her colleagues will soon examine preliminary data from eight volunteers to see if the sleep restriction is an adequate stressor to slow healing time. Once they are confident with the stressor, they will move on to test nutrition interventions to promote immune recovery.

“Blister wounds typically heal in five days for volunteers who receive adequate sleep,” Smith said. “We expect healing time to be delayed by one to two days in volunteers who are sleep restricted, and we expect that healing time will be back to five days in volunteers who consume a specially prepared nutrition beverage during sleep restriction and in the recovery period.”

Smith and her colleagues hope to provide warfighters with a food item or beverage that they can consume during and after periods of stress that will support their immune system and promote recovery.

Pvt. 2 Daniel Pardo dozes off after a period of sleep restriction in a study conducted by the U.S. Army Research Institute of Environmental Medicine to see how nutritional supplements might help wounds heal in warfighters under stress.



Sharing Knowledge

International scientists discuss Soldier physical performance

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass. (Aug. 21, 2014)

In an era of downsizing and budget cuts, placing the right Soldiers in the right jobs, keeping them healthy and optimizing their physical performance have never been more important.

With that in mind, 325 scientists from around the world gathered in Boston this week for the 2014 3rd International Congress on Soldiers' Physical Performance, or ICSP, to share ideas and increase efficiency in those areas.

"The whole notion here is to get international scientists together to network and to have scientific exchange and dialogue, with a goal of really trying to have a better understanding of how to improve the health and performance of our Soldiers," Dr. Brad Nindl, ICSP co-chair, told participants in a media roundtable Aug. 19. "If you look at the program here, so many countries, so many militaries, are working on the same issues."

Nindl, science advisor at the U.S. Army Institute of Public Health for the U.S. Army Public Health Command and an Army Reserve lieutenant colonel, noted the fiscal constraints under which the U.S. military is now operating.

"So things are going to get leaner," Nindl said. "To improve efficiency, I think we have to look to collaborating with our international neighbors. My goal would be that when people leave here that they have a network of fellow scientists who are working in similar areas."

Nindl's co-chair, Marilyn Sharp of the U.S. Army Research Institute of Environmental Medicine at Natick Soldier Systems Center, has been working to develop physical performance standards for Soldiers in an effort to predict who would be the best fit for a given job.

"Our goals right now are to try to come up

with ways to place the best Soldier in the right job, and in that way, we will reduce injuries and optimize performance," Sharp said. "This is coming at a critical time. Everyone has to be able to do their job and do it well as we reduce the number of Soldiers that we have in our Army."

As the Army rolled out its Performance Triad, which focuses on improving Soldiers' activity, nutrition and sleep, the international gathering also looked at ways to keep warfighters healthy.

"There's so much scientific information known in terms of how to improve Soldiers' sleep, activity and nutrition that the challenge for all of us is to operationalize this for the Soldier on the ground, for the leader on the ground," Nindl said. "There are many things that we can do, many effective strategies that we can implement, if we continue to be innovative."

"The way that's going to be successful, I think, is by partnering with other nations, our international partners, and by breaking down stove pipes, breaking down communication barriers across different Army commands, different Army units, so that there's a unity of effort going forward."

Advances in Soldier equipment present ongoing challenges for these scientists.

"I think Soldier load has been a problem for decades," Sharp said. "And every time we lighten Soldiers' load, we add another piece of equipment to make it worse."

Sharp added that Soldier load has steadily increased since the Civil War, despite a recent 20-year effort to lighten it.

"The amount of load that you carry both in absolute terms and relative to your body weight is going to increase your injuries while

you're deployed," Sharp said. "So I believe it's a very big problem that we need to continue to work to solve."

Dr. Nigel Taylor, an associate professor in the Centre for Human Physiology, School of Medicine, University of Wollongong, Australia, said that location of the load is also important.

"For instance, placing one kilogram on the foot is eight times more metabolically inefficient than placing that one kilogram on the torso," Taylor said. "So it's not just the load that they're carrying; you've got to be smart about where it's located, as well."

Sharp noted that load can inhibit a Soldier's ability to move.

"We've seen, particularly, women whose body armor goes across the hip joint," Sharp said. "They can't do their job effectively. They're far less mobile than they need to be."

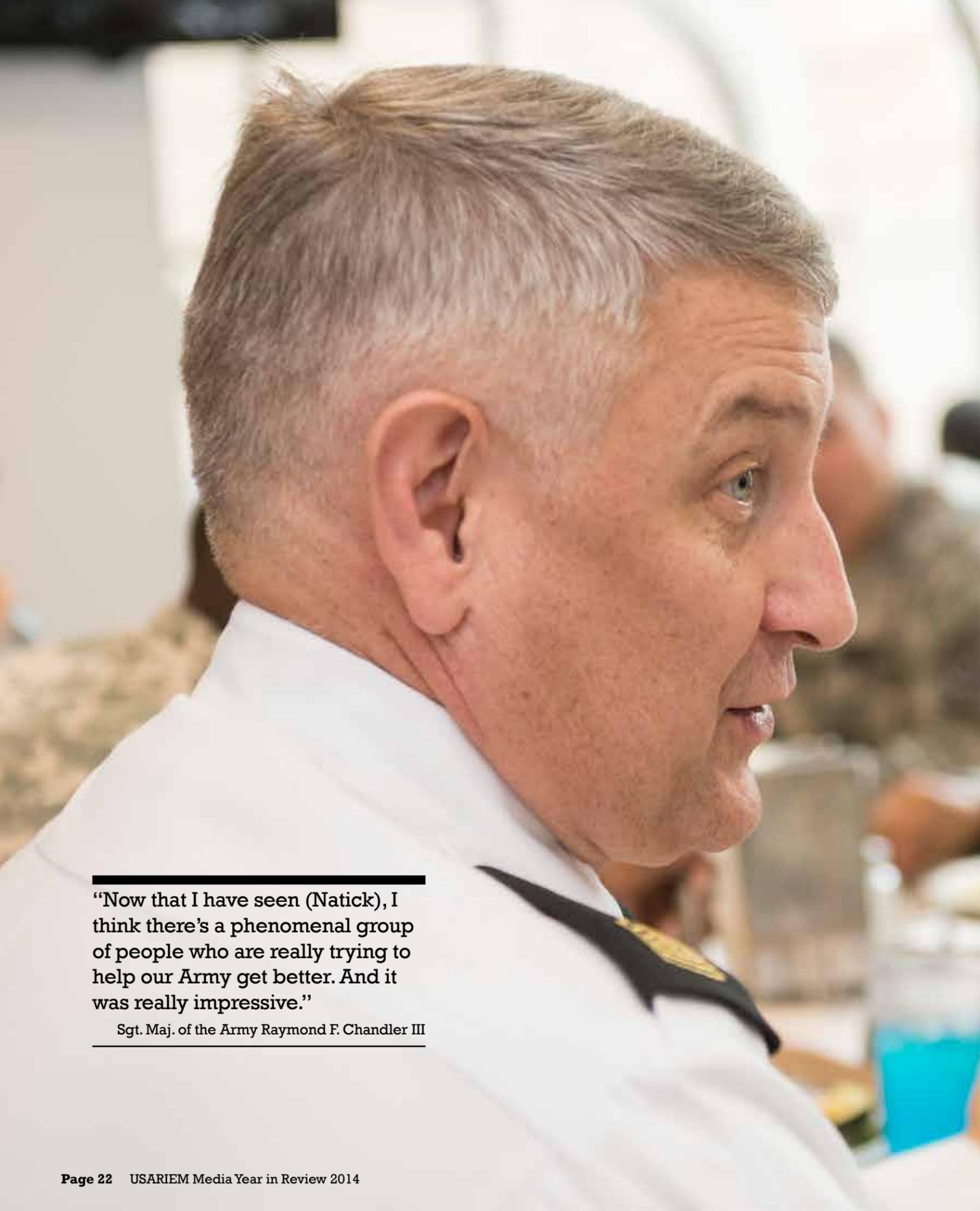
According to Nindl, training and advances in material science and textiles can help with Soldier load, which is more than just a matter of comfort.

"When you survey the medical evacuations from a combat theater over ten or twelve years — 35,000 medical evacuations, plus — the major reason for those medical evacuations was not due to combat-related injury, but is due to musculoskeletal injury. And most of those injuries are from training and overuse," Nindl said. "I think a lot of those injuries would be related to load carriage, as well. Musculoskeletal injuries, particularly of the lower body, are a major problem, a major threat to our force, whether in garrison or whether in a combat theater."

Sharp said she hopes that these scientists return home with "a better understanding of what other countries are doing in a more detailed way. A better understanding of the science of Soldiers' physical performance will continue to be critical in ensuring each country's national security."

Taylor said it's not enough for scientists to sit and wait for the next paper or book to come out with new information on Soldier physical performance. He added that years can be wasted that way.

"Knowledge is not a static phenomenon," Taylor said. "It's continually growing. We need to be contributing to the growth, sharing our knowledge, and learning from others in all countries, because no one country has a monopoly on expertise."



“Now that I have seen (Natick), I think there’s a phenomenal group of people who are really trying to help our Army get better. And it was really impressive.”

Sgt. Maj. of the Army Raymond F. Chandler III

On the 13th anniversary of a day etched in the nation’s collective memory, the Army’s highest-ranking non-commissioned officer visited the Natick Soldier Systems Center, or NSSC.

Sgt. Maj. of the Army Raymond F. Chandler III began the day by participating in NSSC’s Patriot Day Ceremony, which recalled the terrorist attacks of Sept. 11, 2001.

“This is a day that we should recognize and remember,” Chandler said at a town hall later in the day. “What we do today and over the last 13 years has been predicated on events that happened (on 9/11).”

Chandler pointed out that he had joined the Army 34 years ago.

“But it’s a different circumstance than you that have chosen to join after 9/11,” Chandler said. “You make up one percent of the American population. You’re the top one percent. You’ve chosen to do something that 99 percent of the American people are either unwilling or unable to do.”

After attending the ceremony, Chandler toured Natick’s unique facilities and learned more about research underway around the installation. He heard about the Physical Demands Study, which will determine the physical requirements for combat-related jobs; received a combat rations overview; visited the High Performance Fiber Facility and the Thermal Test Facility; and was briefed on operational energy and base camp technologies.

During demonstrations related to the Physical Demands Study, Chandler told Soldiers from the U.S. Army Research Institute of Environmental Medicine how important their work was.

“What you’re doing now is going to make a difference in what we do for physical training,” Chandler said. “You’re making history for the Army, because out of this will come change. I’m excited about what you’re doing.”

Chandler added that the study was helping to bring about “transformational changes in the Army.”

Following lunch with Natick Soldiers, Chandler held his town hall, in which he spoke about the “plague” of sexual assault and suicide on the Army that “we, as Soldiers and civilians, can solve.”

Before departing from Natick, Chandler took a moment to talk about what he had seen during his visit, including “capabilities that I had no idea the Army even had. The ability to take a polymer and turn it into a material that could be developed to lighten the Soldier’s load or provide them better comfort in extreme weather — to me, that was one of the most impressive things I saw today.”

Chandler, a Massachusetts native, said it took him three and a half years to get to Natick as sergeant major of the Army.

“But now that I have seen it, I think there’s a phenomenal group of people who are really trying to help our Army get better,” said Chandler, “and it was really impressive.”

Top: Sgt. Maj. of the Army Raymond F. Chandler III shakes hands with a Soldier after a demonstration of the Physical Demands Study at Natick Soldier Systems Center. Center: Chandler listens to Jeremy Whitsitt during a visit to the Combat Fielding Directorate. Bottom: Chandler, left, speaks to Col. Ross Poppenberger, Product Manager Force Sustainment Systems, second from right.



Inset photos: Top: Sgt. Don Vetch, Massachusetts Army National Guard

SMA visits Natick

Talks of ‘transformational changes’ in Army

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass. (Sept. 11, 2014)



NSSC This Week Video News Release:
Tazanyia Mouton reports on the Sergeant Major of the Army visit to Natick.
<http://bit.ly/1utn1MY>

Under secretary says Natick 'powers' Army

Carson sees science behind the Soldier

By John Harlow, USAG-Natick Public Affairs / NATICK, Mass. (Sept. 10, 2014)

The afternoon started with a fireball, and finished with Under Secretary of the Army Brad Carson chatting with senior non-commissioned officers about the science behind the Soldier.

Carson learned about the flame retardant testing done on uniforms at the Ouellette Thermal Test Facility here.

The 8,100-square-foot facility, which opened in 2008, features four labs and a propane test cell, where four-second flash-fire testing can be done, with eight burners on a full-scale manikin. There are 123 channels. Each channel has a sensor attached to it. Test results are run through computer models to predict second- and third-degree burns.

Carson spoke with researchers from the U.S. Army Research Institute of Environmental Medicine and the Natick Soldier Research Development and Engineering Center about the challenges they face going forward.

"This is what I have been looking forward to seeing," said Carson during his meeting with researchers. "This is a place where you do the work that powers our Army. We are a people-centric service. The Soldier is the end all, be all of our own service. The work that you guys do is extremely important."

At the Doriot Climatic Chambers, the under secretary toured the facility that is a unique

Army asset. He toured a rigid wall shelter being tested in minus-50-degree temperatures. The chambers can simulate almost any weather condition in the world, ranging from minus 70 degrees to 170 degrees, with sustained winds at 40 miles per hour. The chamber also has the ability to produce rain at the rate of four inches per hour.

The rigid wall shelter is the next generation in base camp systems. During testing earlier, at Fort Benning, Ga., it showed better comfort for the Soldiers, and the shelter requires less energy to maintain comfortable living or working conditions inside.

He received a demonstration on Female Body Armor that was named one of the best inventions by *Time Magazine*, in 2012. The improved outer tactical vest, known as the IOTV, was designed specifically for women, and was first worn in combat by Soldiers from the 1st Brigade, 101st Airborne Division (Air Assault). The new armor was designed to offer better protection and to prevent bruised hip bones that women experienced when wearing IOTVs meant to fit men.

With the Soldier as the centerpiece of every Army platform, protecting that Soldier in combat is what drives everyone at the Natick Soldier Systems Center.

The Helmet Electronics and Display System-Upgradeable Protection, or HEaDS-UP,



has been a four-year effort at Natick, to provide mounted and dismounted troops with a more fully integrated headgear system. HEaDS-UP has focused on developing a Technical Data Package of design options and tradeoffs to build a modular, integrated headgear system. Some of these technologies include: improved ballistic materials; non-ballistic impact liner materials and designs; see-through and projected heads-up display technologies; better eye, face and hearing protection; and communications.

It was Carson's first visit to Natick since becoming the 31st under secretary of the Army, earlier this year.

Carson challenged Natick's senior NCOs in a round-table discussion to think about problems they see in the Army, challenges they see in the Army and things the under secretary can do to help.

The majority of the discussion was the loss of talented officers and NCOs.

"We have an exodus, it seems, of captains and majors and NCO's getting out of the Army today," said Carson. "These are people with tremendous amounts of combat experience. They have led men and women in many different circumstances, (and they) are getting out."

"This is a great concern to me as how we keep the best talent in the NCO corps and junior officers," Carson continued.

Carson also gained knowledge of how squads receive aerial resupply through the Joint Precision Airdrop System. The JPADS system can very precisely deliver supplies, from 10 pounds to 42,000 pounds, through GPS-guided technology.

In his brief visit to Natick, Carson received a quick glimpse of the science behind the Soldier.

"It was fascinating to see the work that you do here," said Carson.



USARIEM welcomes new commander

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass. (June 10, 2014)

Col. Thomas G. Eccles III, M.D., became the 20th commander of the U.S. Army Research Institute of Environmental Medicine in a June 9 change of command ceremony.

Eccles took over from Col. Deborah L. Whitmer as Maj. Gen. Joseph Carvalho Jr., M.D., commanding general, U.S. Army Medical Research and Materiel Command, presided. Eccles previously served as chief of the General Pediatrics Service at Tripler Army Medical Center, Honolulu, Hawaii. Whitmer

moves on to the U.S. Naval War College in Newport, R.I.

Carvalho pointed out that in Eccles, USARIEM was getting a Massachusetts Institute Technology graduate, a hazardous materials expert, and a board-certified pediatrician.

“We are confident you come fully prepared for the mission at hand, with a variety of operational and leadership assignments under your belt, as well as deployments in support

of Operation Iraqi Freedom and Operation New Dawn,” Carvalho said.

Eccles, who grew up in Simsbury, Conn., was obviously pleased to be home.

“I’m a native New Englander, a lifelong Red Sox fan — and all that goes with it — an engineer and a physician,” Eccles said. “As such, I’ve followed USARIEM and its unparalleled R&D for more than 25 years.

“I can’t tell you how thrilled I am to be able to serve here with you all. General Carvalho, thank you so much for giving me the opportunity to lead.”

Carvalho recognized Whitmer’s efforts at USARIEM during a challenging period in its history.

“Throughout this time, Colonel Whitmer’s leadership of this organization has been steadfast and laser-focused,” Carvalho said. “Despite budget constraints, she worked tirelessly to ensure researchers could continue to travel and collaborate with partners, ensuring that USARIEM’s work was not halted during these uncertain times.”

Eccles also saluted Whitmer’s service at USARIEM.

“Thank you for your leadership and the friendship you have shown me,” Eccles said. “You have brought a brilliant organization through uncertain times and positioned us for a vital role in the Army’s future. I am honored and humbled to follow you in command.”

Whitmer noted that USARIEM made strides over the past two years despite the fiscal headwinds. She mentioned the Physical Demands Study in particular.

“As a female Soldier and this organization’s commander, I knew this team would lend the finest scientific rigor to this important study that the Army could ask for,” Whitmer said. “I am confident that once your job is complete, you will have provided valid, reliable and accurate results that will be used to select Soldiers for accession into physically demanding occupations, and I am honored to have been leading the organization during this time.”

In closing his remarks, Carvalho praised the “exceptionally fine” people who work at USARIEM.

“The work being done at this organization is critical to our service members,” said Carvalho, “ensuring the health, performance and effectiveness of troops in training or combat.”

USARIEM Soldier earns award

By Kelly Field, USARIEM Public Affairs / Natick, Mass. (Feb. 24, 2014)

Sgt. Crystal Meints from the U.S. Army Research Institute of Environmental Medicine was recently selected as the 2013 U.S. Army Medical Research and Materiel Command Equal Opportunity Leader of the Year.

Meints, a veterinary technician, manages USARIEM’s EO program, which follows the Army’s EO program mission to direct, communicate and sustain a broad effort to ensure nondiscriminatory treatment for military personnel, their family members and civilians regardless of race, color, gender, religion or national origin, and provide an environment free of unlawful discrimination and offensive behavior.

“I am honored to be selected as MRMC’s EOL of the Year,” said Meints. “My biggest goal with this program is to always foster a climate where everyone feels free to communicate their concerns and most importantly where everyone is treated fairly and with dignity and respect.”

Meints was selected because of her oversight of USARIEM’s EO program, which received admirable scores during recent MRMC and U.S. Army Medical Command EO inspections along with an essay about the values of EOL and the EO program to the unit and mission readiness.

Meints was selected from a pool of 55 other EOLS within the MRMC region. She is currently competing for the MEDCOM EOL of the Year. The results have not been posted.

“From the time I got here, it was clear that Sergeant Meints constantly goes above and beyond for our EO program,” said Master Sgt. Miguel Chacon, USARIEM’s senior enlisted leader. “She has owned this program and has made an amazing impact, which has resulted in a great work environment for USARIEM.”

Her numerous accomplishments include training approximately 200 Soldiers within and outside the organization in various aspects of the EO

Sgt. Crystal Meints from the U.S. Army Research Institute of Environmental Medicine was recently selected as the 2013 U.S. Army Medical Research and Materiel Command Equal Opportunity Leader of the Year.

program, leading planning committees for installation and USARIEM Special Ethnic Observances and conducting multiple surveys to identify and communicate key issues within the command.

“Serving as an EOL for USARIEM has been so valuable to me,” said Meints. “It is so incredibly important for me to be the eyes and ears for the commander and to have a pulse on things here. If something is happening to a person regardless of who they are, my main focus is to give them all their options and assist them throughout the process in helping them to find the best possible solution.”

Meints encourages anyone who has questions or concerns about the EO program at USARIEM to contact her. “I am here for all Soldiers, Civilians, and their family members” Meints said. “I am here for everyone, even if it is just to guide them in the right direction or lend a listening ear.”



Making Room for Moms

USARIEM completes exclusive space in response to new law

By Kelly Field, USARIEM Public Affairs / NATICK, Mass. (July 28, 2014)

Recently, the U.S. Army Research Institute of Environmental Medicine completed a room exclusively for new mothers. Called "Nursing Mom Room," this space is reserved for any USARIEM employee or guest who needs to lactate for their new baby.

The Nursing Mom Room provides nursing mothers a private, comfortable and clean space to express milk. Mothers also have a designated refrigerator to exclusively store their milk throughout the day without fear that it could be contaminated.

USARIEM created this room in response to a new law under the Affordable Care Act that says employers are required to provide a space to express milk as frequently as needed by the nursing mother, for up to one year following the birth of the employee's child. The space provided by the employer cannot be a bathroom, and it must be shielded from view and free from intrusion by co-workers or the public.

Capt. Michelle Mastrobattista, USARIEM military detachment commander, who is expecting her second child later this summer, helped to make this room happen. She said it was the updated law plus requests from other USARIEM mothers and personal experience that led her to spearhead this project.

"When I first took command, I heard a few people asking about where their lactating guest could go; we didn't have a space other than the bathroom," Mastrobattista said. "I remembered my own personal experiences of having to use a bathroom and how

uncomfortable it was. When I found out that providing an appropriate non-bathroom space was a law, I recommended to the institute command team how we could be in compliance."

The room has two private stations, each with a comfortable chair, foot stool, side table and electrical outlet. Each station has its own privacy door. In the common space, there is a new refrigerator to store expressed milk and there are hooks to hang garments or jackets on. Mastrobattista said she personalized the room based on what she knew that a new mother would need.

"As far as design, I had a few requirements based on my experience, as well as feedback I received from other mothers in the organization," Mastrobattista said. "One thing many people noted was that the color should be soothing instead of plain white. The color is a spa sea-green hue, and I've only heard good things about the color.

"Two other small details of the room which may not seem obvious which we included were the foot stools and electrical outlets," Mastrobattista said. "Most pumps which nursing mothers use are electrical, not manual, so we needed each station to have that. As far as the foot stools, they add an extra level of physical comfort to the mother. Most nursing rocking chairs come with stools, which add to the relaxing environment."

Mastrobattista said that the room was created to support new moms so that they may continue to successfully meet the organization's

mission while ensuring their personal needs are being met during duty hours.

"The room is important because it shows USARIEM civilians and military members that we care about them," Mastrobattista said. "USARIEM has afforded the space and resources for this project because becoming a new parent, whether for the first or fifth time, is a joyous time which requires support not only from family and friends, but also from employers and supervisors."

Although the Nursing Mom Room was Mastrobattista's idea, she commends the USARIEM command team for supporting the project.

"The law doesn't state we need a nice and inviting room," Mastrobattista said. "It doesn't say that we need a permanent room at all, but that we need to provide non-bathroom space as needed for mothers. I think the level of commitment the command has to its employees is reflected in this room."

Mastrobattista is proud of the mark she has left on USARIEM and hopes mothers use it for years to come.

"The room is a permanent fixture in the building," Mastrobattista said. "Instead of waiting for a nursing mother to raise her hand and request special space, USARIEM has already provided such a space so that mothers may use it at will during their duty day."

"The room is important because it shows USARIEM civilians and military members that we care about them. USARIEM has afforded the space and resources for this project because becoming a new parent, whether for the first or fifth time, is a joyous time which requires support not only from family and friends, but also from employers and supervisors."

Capt. Michelle Mastrobattista, USARIEM



Photos: Philip Engleau, NSRDEC Strategic Communications

Turning to 'Home Base'

Natick Soldier seeks help with TBI

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass. (Feb. 10, 2014)

He grew up a Boston Red Sox fan in Warwick, R.I., so Sgt. 1st Class Adam Morelli had long dreamed of touching home plate at Fenway Park.

When he did just that during the annual “Run/Walk to Home Base” fundraising event last year, he got something even more valuable — contact information for the Home Base Program, which helps veterans and families who are coping with post-traumatic stress and traumatic brain injuries. Recently, he took advantage of it.

“Immediately, on my very first appointment, seeing the TBI doctor, he pointed out things that no other doctors had caught yet,” said Morelli, 33, the detachment sergeant at the U.S. Army Research Institute of Environmental Medicine at Natick Soldier Systems Center.

Morelli’s problems with TBI date back to April 2008, when he was a medic with a Military Transition Team in Mosul, Iraq. He had relieved the turret gunner in a Mine-Resistant Ambush-Protected, or MRAP, vehicle during a patrol.

“About 300 meters away from the combat outpost and about 15 meters off to my right side was an IED that we didn’t know (about),” Morelli recalled. “And it detonated and just rocked the entire truck. Luckily, no damage to the truck, no damage to anyone inside — apparently, just to my brain.”

After the explosion, Morelli got back into position and the convoy kept rolling.

“My team was more important than I was at that point,” Morelli said. “Later

on that night, I had a headache, but who wouldn’t have a headache? That wasn’t the first time that we had an IED go off near our trucks. It just happened that that was the first time that I was in the turret.”

Soon, Morelli was experiencing memory loss, but he pushed through it.

“It wasn’t important to me,” Morelli said. “What was important was my guys.”

By the time his deployment ended, Morelli’s memory loss had become more noticeable.

“When I first got back, I kept forgetting the bread and picking up \$30 of other stuff at the store,” Morelli said. “Now (my wife) takes pictures of stuff and texts it to me and sends me a list on the phone so I don’t forget, because otherwise I will.”

And the headaches persisted. “It’s above my left eye, every time,” Morelli said.

Morelli has tried a variety of medications and has undergone speech and memory therapy since returning home.

“It’s always been trying to find that happy medium to what’s going to decrease my headaches but also not make me ineffective,” said Morelli, “because I still want to be a good Soldier.”

That goal brought him to the Home Base Program, a unique partnership between the Red Sox Foundation and Massachusetts General Hospital that began in 2009. In his

initial visit, the doctor asked him to march in place.

“I’m marching eight feet across the room and didn’t know it, didn’t feel like I was moving forward,” Morelli said.

To address his balance problems, Morelli began vestibular physical therapy at Home Base.

“Since my deployment in 2008, I’ve been compensating and figuring out ways to get around everything,” said Morelli, “whereas, now with Home Base, they’re working on ways to stop my compensating and figure out ways to overcome those obstacles.”

He has compensated well. In addition to his duties at USARIEM, the father of two is also pursuing an associate degree at American Military University and coaching youth wrestling in his native Rhode Island.

Through it all, Morelli never hid his struggle with TBI from his Soldiers at USARIEM.

“I think that more emphasis needs to be put on getting the help that people need, and that’s why I talk with my Soldiers,” Morelli said. “I don’t make it a secret, because I want them to see that even as the detachment sergeant of this unit, it’s still OK to go get the help that we need.

“We can still be great Soldiers and do great things for the Army. I think that that’s an important message.”



Igniting a Passion for Science

By Kelly Field, USARIEM Public Affairs / NATICK, Mass. (April 25, 2014)

During the April school vacation week, Massachusetts teachers were treated to a preview of the Gains in the Education of Mathematics and Science, or GEMS, program at Natick Soldier Systems Center.

Teachers from a variety of school districts throughout MetroWest in grades six through nine participated in this program, which was created as a collaborative effort between the U.S. Army Research Institute of Environmental Medicine and the Natick Soldier Research, Development and Engineering Center.

“As Lab Champion of the GEMS program, I was approached with the idea of offering GEMS to teachers so that they can have a better handle on what the students are experiencing through the summer program,” said Army Capt. Carrie Quinn, a research physiologist at USARIEM, who also serves as the GEMS program director and co-creator of the GEMS for Teachers program. “So it was a natural fit for me to lead the GEMS for Teachers program.”

GEMS for Teachers was created at NSSC and is the first program of its kind aimed at giving middle-school teachers the hands-on op-

portunity to engage in real-world science and to take those experiences back to their own classrooms. At the end of this unique week, the teachers received a Science, Technology, Engineering and Mathematics Kit that had starter pieces for a variety of the experiments they conducted throughout the week, so that they could then implement those experiments in their classrooms.

Quinn also asked the resource teacher and Near Peer Mentors who run the summer program to be a part of this session. In using this format, the teachers could get a real feel for the summer GEMS program for middle-school students, and the mentors gained invaluable lessons in leadership.

“The Near Peer Mentors are in charge of the curriculum and instruction for the summer GEMS program, so it was important that the teachers receive their instruction from the Mentors that are vital to our summer program,” Quinn said.

“This way, the teachers could offer tips and guidance to the Mentors, and the Mentors could provide vital insight on what works and what doesn’t for each of the lab ex-

periments and what excites the students and encourages the most ‘ah-ha’ moments relative to other experiments,” she added.

Joanna Graham, the STEM outreach coordinator for NSRDEC who co-created the GEMS for Teachers program with Quinn, agreed that the value of this program is in the reciprocity of learning.

“The model set up through the summer program, by design, has middle-school students instructed by high school students,” Graham said. “This allows for the middle-school students to learn from Near Peer Mentors close in age to engage the students in the process. This also gives the Near Peer Mentors critical leadership and life skills equally as important as the technical STEM-related skills.”

According to Graham, NSRDEC supports the GEMS summer program through tours of the testing facilities on post. Their goal for this session was to equip teachers with the same interactive STEM-related activities that the summer students receive so they can incorporate the experiments into their annual curriculum.

“This week was about offering the highly successful GEMS summer program to middle-school educators of the Commonwealth,” Graham said. “There has been so much positive feedback from the middle-school students over the summer that we wanted to take that valuable information and turn it into a teacher training.”

Teachers who attended this program said that it was not only entertaining, but it gave them ideas and tools to bring back to their classrooms.

“I really like what you are doing here,” said Jackie O’Brien, a sixth-grade teacher at the Up Academy Leonard, a tuition-free Lawrence public middle-school with students in grades six through eight. “My goal as a teacher is to get kids interested in learning and create a passion for lifelong learning. I definitely want to try so many of the activities I learned here.”

With all the excitement generated from this GEMS for Teachers session, Quinn is eager to capitalize on the program’s popularity and begin the summer session of GEMS.

“Ideally, the GEMS for Teachers program will help us promote the GEMS summer program and expand our enrollment to areas outside of Natick,” Quinn said. “This will diversify the student base that we are able to expose to the amazing science we engage in at NSSC.”



By Kelly Field, USARIEM Public Affairs / NATICK, Mass. (Sept. 2, 2014)

Oil spills, crime scene investigations and DNA sampling. Usually, these words would send an organization into a tailspin, but this is just another day of summer camp for Massachusetts middle school students.

This summer the U.S. Army Research Institute of Environmental Medicine once again sponsored the Gains in the Education of Mathematics and Science, or GEMS, program at Natick Soldier Systems Center here. The GEMS program is an extracurricular summer science education program that enables middle-school-aged students to experience science in a real laboratory setting.

GEMS has a multidisciplinary educational agenda, and students take part in grade-appropriate, hands-on activities relating to science, engineering, mathematics, computational sciences, computational biology, biomedical sciences, chemistry and biology.

Capt. Carrie Quinn, the GEMS lab champion for USARIEM, said her main goal for GEMS is to get students enthusiastic about science and math while fostering a sense of community.

“Our main objective was to take science and math out of the classroom and put it in a real-world setting,” said Quinn, who is also

a research physiologist for USARIEM. “The kids got to see things here that they wouldn’t be able to experience anywhere else. They get to truly see how science and math are everywhere — even in the Army.”

Now in its fourth year, the program has grown from four sessions with 100 children to six programs, GEMS I, II and III, with nearly 200 students in attendance. Each GEMS session allows students to return the following summer, slowly building on the lessons learned the summer before and encouraging future scientific leaders.

Advanced high school- and college-aged students called “Near-Peer Mentors” lead the GEMS programs, and serve as role models for the students. Near-Peer Mentors completed extensive training at a science boot camp prior to the student interns’ arrival. The mentors learned how to conduct and teach the GEMS experiments.

“The Near-Peer Mentors are in charge of the curriculum and instruction for the summer GEMS program; they are the driving force behind this program,” Quinn said.

While exploring the GEMS program this year, the students investigated problem-

solving, estimation, water properties, physics/forces of motion, forensics, and even got to see a helicopter land.

Collin Newman, a middle school student, participated in the GEMS program. He said his favorite parts of the GEMS were the hands-on experiments he doesn’t normally get to do in the classroom.

“You get a big experience in science,” Newman said. “Plus, it is really fun. I like the hands-on experiments it takes to do GEMS.”

The Army has a long history of recognizing that a scientifically and technologically literate citizenry is this country’s best hope for a secure, rewarding and successful future.

“We created the GEMS program as part of this realization that science and mathematics (are) important to instill in the younger generations for future prosperity,” Quinn said.

GEMS began as a single program at then-Walter Reed Army Medical Center, in 2005, and has expanded to 12 programs across the major Army research installations, including the one at USARIEM, which runs annually in July and August.



Balad to Boston

USARIEM Soldier makes a marathon journey

By Kelly Field, USARIEM Public Affairs / NATICK, Mass. (April 25, 2014)

As he crossed the finish line of this year's Boston Marathon race, Capt. Craig Thompson took a moment to look around at the thousands of spectators cheering him on and enjoy the moment.

He had accomplished something that six years ago when he was stationed in Balad, Iraq, he would have never thought possible. At that moment, he thought, it was all worth it.

In 2008, then 1st. Lt. Thompson was deployed to Iraq as a platoon leader in the 591st Medical Logistics Company. One day a friend encouraged him to run the Boston Marathon Forward, a shadow race of the Boston Marathon that would be run at Camp Taji that April.

Thompson, who had never run a marathon before, thought this would be a great opportunity to stay motivated while deployed, as well as provide an opportunity to check something

off of his bucket list, running a marathon.

"This was something I planned on doing once and then sitting back and being proud of it for the rest of my life," said Thompson, now a medical logistics officer for the U. S. Army Research Institute of Environmental Medicine. "I trained for two months and just remember the day of the race there was nothing to look at but dirt and sand and having to run over and over the same patches of land, as space on the post was limited."

After finishing the race in a time he now considers slow for himself, he felt a determination to do it again and do it faster. "This really kick-started what I am doing now and sparked my passion for running these races," Thompson said.

From then until Marathon Monday 2014, Thompson has gone on to complete eight marathons, two 50-mile ultra-marathons and

Capt. Craig Thompson, a medical logistics officer for the U. S. Army Research Institute of Environmental Medicine, poses with medals he earned for finishing two Boston Marathons. The first was in Iraq in 2008; the second was in Boston in 2014.

an Ironman Triathlon. He said, however, from the beginning the ultimate goal for him was to qualify for and run in the Boston Marathon.

"It's been a goal of mine since the beginning," Thompson said. "Only the most elite runners qualify for the race, so to run in the actual Boston Marathon, to me, it's a big deal."

This goal became even more important after he witnessed the events of 2013's marathon bombing at the finish line. Thompson, who had regularly followed the marathon, remembers watching in horror as the day's events unfolded from Fort Detrick, Md., where he was stationed at the time. His resolve to qualify for the 2014 Boston Marathon became so much stronger.

"I knew I would be in Boston this year and was planning on running it anyway, but suddenly it became so much more special," Thompson said. "I wanted to be a part of the atmosphere this year that told the terrorists, you did not stop Boston. You made us stronger."

Thompson said he could feel that strength and energy from the thousands of racers and spectators who participated in the marathon this year. He said it gave him the boost he needed to finish the race with a qualifying time to run again next year "without a second to spare" at 3 hours, 14 minutes, 59 seconds.

"The atmosphere was amazing, nothing like the sand and dirt in Iraq," Thompson said. "Those last several miles starting at Heartbreak Hill take every ounce of strength you have. Even though I was so tired, the support I got from all the people cheering me on kept me going strong. That is a moment I will never forget."

As Thompson completed his ninth marathon, he said he felt very accomplished. He had achieved something that six years ago, he didn't consider possible. For now, Thompson said he will keep on running. He has his sights set on another Ironman competition in September.

"All of this is about facing challenges," Thompson said. "Being able to accomplish things that I once considered impossible is a tremendous feeling. I feel that if I am determined and work hard enough, I can accomplish anything."

A Soldier from the U.S. Army Research Institute of Environmental Medicine has been named Army Medicine's Soldier of the Year.

Spc. Travis Crook, a Biological Science Specialist with the U.S. Army Research Institute of Environmental Medicine, won the MEDCOM Best Warrior Competition that took place the first week of May.

During the weeklong competition held at Camp Bullis, Texas, Crook competed against dozens of Soldiers from around Army Medical Command in a series of challenging events meant to test their physical and mental stamina, as well as their warrior task knowledge, to earn the title 'best of the best.'

"When they called my name, I just had a big smile on my face," Crook said. "It meant so much for me to win, because it means I can do what the Army needs Soldiers to do. Competing for Best Warrior was not just a onetime event; it's a lifestyle for me. That's the profession."

Crook said the competition consisted of the Army physical fitness test, weapons qualification, warrior tasks and battle drills, mystery events, day and night land navigation, obstacle course, a written exam with essay and a board. The culminating and most challenging event, Crook said, was a 12-mile road march that had to be completed in less than three hours while he wore a 35-pound ruck sack and full battle rattle.

"I was so tired, my boots were soaked like I had walked through water, but I knew what I had to do to give me the best chance of winning," Crook said.

It is this passion for being the best that immediately resonated with Crook's leadership.

"Specialist Crook's performance throughout all the events was nothing short of amazing," said Master Sgt. Miguel Chacon, the senior enlisted leader for USARIEM. "Hearing the news, I burst into a roar of pride. This is a Soldier that went out to prove he is the best warrior, and that's something I have great pride in, knowing we as an Army have prepared this Soldier and he is ready for anything that comes his way ... That's something we all should be proud of."

As for Crook, he is humble and grateful for all the support that others have given him throughout his preparation and the competition.

"There are so many people to thank from USARIEM, MRMCM and ISR," Crook said. "All my mentors made sure I had every resource I



USARIEM's Crook named MEDCOM Soldier of the Year Moves on to Army Best Warrior Competition

By Kelly Field, USARIEM Public Affairs / NATICK, Mass. (May 13, 2014)

needed and they were always positive, which helped me the most. They trusted me to be successful and kept reminding me that they were already so proud of me, and for that I am so thankful."

Next up for Crook is to represent MEDCOM at the Army-wide Best Warrior Competition later this year, but for now he is taking this win in stride.

"Right now it is best to recover so I can really jump in. I want to be better than before, better than those I am competing against so I can be an example to other young Soldiers," said Crook. "I want to go there and be my best, because that's what the Army expects."

2014

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