

# COMBAT & CASUALTY CARE

Spring 2022  
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**PROJECTING OPERATIONAL  
SUPPORT MEDICINE**

## COMMANDER'S CORNER



**COL Constance Jenkins**  
Commander  
U.S. Army Medical Research  
Institute of Infectious Diseases



**Master Sgt.  
Erik Waldrip**  
Medical Operations  
Superintendent  
27th Special  
Operations Squadron  
27th Special  
Operations Group



**Major Zachary  
Dreaden**  
Operational Support  
Medicine Flight  
Commander  
27th Special  
Operations Squadron  
27th Special  
Operations Group

- Special Operations Forces Medical Element (SOFME)
- Joint Special Operations Medical Training Center (JSOMTC)
- Medical Logistics ■ Medical Evacuation Optimization
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## SPECIALIZED CASUALTY CARE ANYWHERE

The 27th Special Operations Wing, Cannon Air Force Base, New Mexico, is the western home of Air Force Special Operations Command, executing and supporting specialized airpower to achieve America's security objectives.

By Staff Sergeant Candin Muniz

## FEATURES



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#### FULL-SPECTRUM CARE PROJECTION

**Master Sgt. Erik Waldrip**  
Medical Operations Superintendent  
27th Special Operations Squadron  
27th Special Operations Group  
Cannon AFB, New Mexico



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**Major Zachary Dreaden**  
Operational Support Medicine Flight Commander  
27th Special Operations Squadron  
27th Special Operations Group  
Cannon AFB, New Mexico



### COMMANDER'S CORNER

#### PANDEMIC LESSONS AND BEYOND

**COL Constance Jenkins**  
Commander  
U.S. Army Medical Research  
Institute of Infectious Diseases  
Ft. Detrick, Maryland

**Cover:** Special operations medics from the United States (left) and Norway stabilize the airway of a simulated casualty during the North Atlantic Treaty Organization (NATO) Special Operations Combat Medic (NSOCM) course culminating field training exercise near Pfullendorf, Germany. NSOCM was a 22-week course offered by the International Special Training Centre which intends to provide training on advanced combat trauma management with a special emphasis on clinical medicine and prolonged field care. (U.S. Army photo by Staff Sgt. Jessica Nassirian)

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### INDUSTRY PERSPECTIVE

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The Joint Special Operations Medical Training Center (JSOMTC), Ft. Bragg, North Carolina, teaches Special Operators that they put fellow Servicemembers lives on the line if they don't have training enabling them to care for patients in a life and death situation.

By SFC Brian Wilkerson, SFC Tom Dillard, MSG Seth Elijah, and Mr. Daniel Doerr



### Answering the Call to Protect a Nation

On orders of the White House, the Defense Logistics Agency (DLA) has been working with the U.S. Postal Service since mid-January to pack and distribute 500 million free COVID-19 at-home tests to American households.

By Dawn Bonsell



### INDUSTRY HIGHLIGHT

Difference between polymerase chain reaction (PCR) and antigen testing for COVID-19. The Accula™ SARS-CoV-2 Test delivers accuracy and sensitivity that's in line with lab-based testing without the inconvenience of longer wait lab results.

By Michaela Griffin



### INDUSTRY PARTNER

The challenges of modern future operability supporting Multi-Domain Battle and Large-Scale Combat Operations will be measured by efficiency in medical evacuation and the optimization of positive casualty outcomes despite extended field time.

By Frederick Gerber

# COMBAT & CASUALTY CARE

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## INSIGHTS

With the arrival of Spring comes a focal shift to the specialized training and casualty care that only Special Operations Forces (SOF) receive. From the latest in Operational Support Medicine (OSM) to advances in tactical combat casualty care (TCCC) simulation for capabilities in prolonged field care, today's global battlefield point-of-care application is seeing greater hope for full, or close to full, patient recovery than ever before.

In the Spring 2022 issue of *Combat & Casualty Care*, we delve into the world of clandestine SOF-tailored combat medicine with a look at lessons learned and evolving training that keep America's SOF medics at the fore of current-day field care specialization. A special feature to *C&CC* gives readers in-depth look at the 27th Special Operations Wing, Cannon Air Force Base, New Mexico, and how the men and women of the 27th Special Operations Support Squadron (SOSS) bring precision care to those who take to the air. Medical Operations Superintendent for the 27th SOSS, Master Sergeant Erik Waldrup spoke recently with *C&CC* about the key drivers of today's OSM prioritization representing the primary mission focus of Special Operations Forces Medical Element (SOFME) personnel. From lessons presented by the unique needs and challenges of SOF casualty evacuation (CASEVAC), Major Zachary Dreaden, OSM 27th Flight Commander, relayed the criticality of cutting-edge training of SOFMEs at home station for maximizing casualty outcomes well beyond point of injury.

With training in mind, this issue of *C&CC* sheds light on the foundational preparation the Joint Special Operations Medical Training Center (JSOMTC), Ft. Bragg, North Carolina, brings to the development of tomorrow's SOF medics. The latest techniques in models-based simulation re-creating trauma care such as advanced cardiac life support and prolonged field treatment are enabling consistency in high-level application for greater predictability of positive outcomes.

This issue of *C&CC* also spotlights lessons learned from the COVID-19 pandemic. The Commander's Corner interview with COL Connie Jenkins, Commander, U.S. Army Medical Research Institute of Infectious Diseases (USMARIID), looks at what USMARIID is doing to implement lessons learned from two years of frontline fighting. The critical importance of viral testing and the efficiency and efficacy of that testing, from lab-based polymerase chain reaction (PCR) to antigen options, is clarified in this issue's Industry Highlight.

Not be remiss, we give a shout out to advanced product suppliers everywhere who directly support those risking life and limb in the combat zone. From capabilities in portable oxygen ventilation and vital signs monitoring spotlighted in this issue's Industry Partner to portable x-ray for point-of-injury determination in this issue's Industry Perspective, technology has never been better poised to answer the combat casualty call.

As always, we welcome any comments and thank you for your continued readership!

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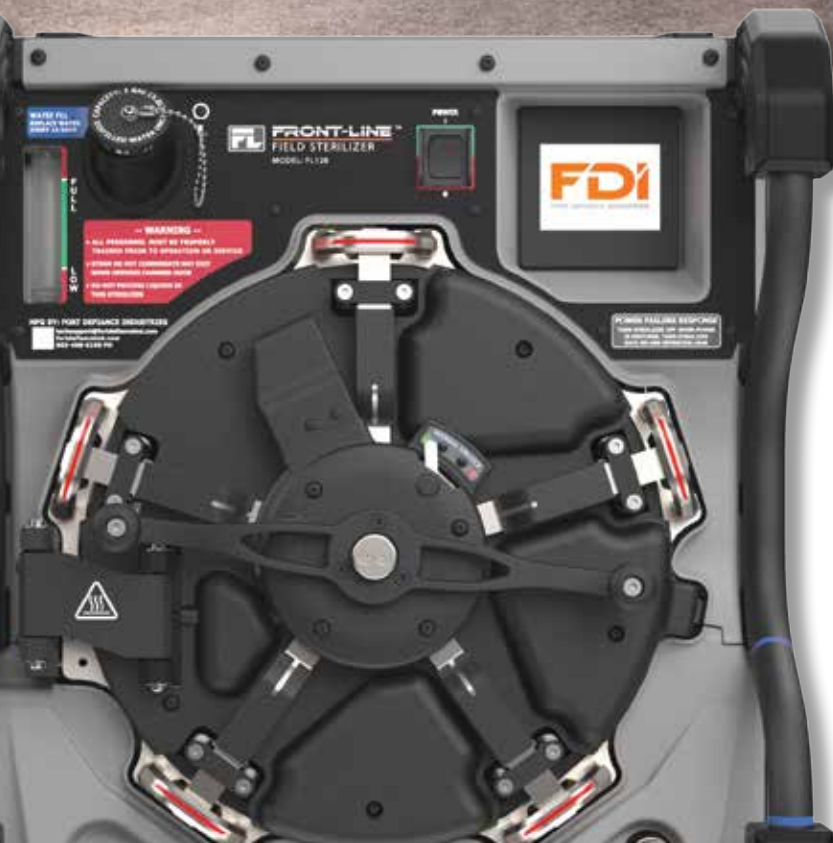
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# SPECIALIZED CASUALTY CARE ANYWHERE

The 27th Special Operations Wing (SOW), Cannon Air Force Base, New Mexico, is the western home of Air Force Special Operations Command. The 27th SOW develops, sustains, and employs professional Air Commandos executing and supporting specialized airpower to achieve the nation's security objectives.

By Staff Sergeant Candin Muniz, 27th SOW



Two Airmen assigned to the 27th Special Operations Support Squadron Special Operations Forces Medical Element, prepare a packaged patient for transit during a Prolonged Field Care Exercise at Melrose Air Force Range, New Mexico. A packaged patient is a term used for when a severely injured individual is prepared for transit. (U.S. Air Force photo by Senior Airman Maxwell Daigle)

Air Force Special Operations Command (AFSOC) has selected the 27th SOW as a pathfinder for innovation and change within the command, and tasked the wing with multiple initiatives transforming the command into the AFSOC we need for tomorrow's fight. Those initiatives include the new AFSOC Force Generation deployment model, Mission Sustainment Team initiative, Mission Defense Team initiative and more. Part of these innovation efforts include the development of next generation medical care for our troops in austere locations. The 27th Special Operations Support Squadron (SOSS), Operational Support Medicine (OSM) flight is taking on that challenge while leading the way for Special Operations in field medical care.

## FOSTERING FIELD CARE CAPABILITIES MODERNIZATION

The primary mission of the 27th OSM flight is to deploy with, and in support of, Special Operations Forces (SOF) to deliver SOF combat medical support, and to modernize and advance SOF medical capabilities to maximize warfighter performance. They provide high quality, state-of-the-art prevention-based health care for AFSOC members, families, and beneficiaries. One of the primary ways the 27th OSM accomplishes its mission is through the Special Operations Forces Medical Element, or SOFME. The SOFME is a three-person team, AFSOC's primary deployable medical element and the core AFSOC field medical team. The SOFME normally consists of one flight surgeon and two Special Operations Independent Duty Medical Technicians, or SOIDMTs.

This team, however, may be tailored to meet operational mission requirements and may include SOF-trained physician assistants (PAs) in place of a SOIDMT. SOFME personnel have extensive medical training focused on combat health service support, trauma care, aeromedical decision making, and bare base preventive medicine support. The key capability the SOFME provides is deployed aerospace medicine support for AFSOC aircrews and special duty personnel. It also provides medical expeditionary combat support (ECS) and casualty evacuation (CASEVAC) for AFSOC and other SOF units. SOFME personnel receive extensive training that goes beyond their normal duties outside of special operations. SOIDMTs have an especially broad range of duties. Outside of special operations, an Air Force Independent Duty Medical Technician (IDMT) is the only enlisted health care provider in the Air Force. They can provide care in the absence of a licensed, privileged or credentialed health care provider at Air Force medical treatment facilities, host medical treatment facilities, and remote or deployed sites. With this responsibility, IDMTs are required to maintain proficiency in multiple disciplines throughout the medical field. On an average day an IDMT could be performing dental, pharmacy, public health, bioenvironmental engineering, immunizations or laboratory duties.

## SUPPORTING FLEXIBILITY IN MULTI-TRAUMA CARE APPLICATION

At the 27th OSM flight, and across AFSOC, SOIDMTs take their duties above and beyond their regular Air Force mission set. SOIDMT minimal





27th Special Operations Support Squadron independent duty medical technicians provide an airway and intensive medical care to a casualty mannequin during casualty evacuation training at Cannon AFB, NM. This was the first time the CASEVAC course has been offered at Cannon, providing qualified training for IDMTs without the need to travel to other bases. Conducting the training at Cannon also allows the students to experience high tempo operations in a natural environment similar to what they will face downrange. (U.S. Air Force photo by Airman 1st Class Christopher Storer)

training includes: Advanced Cardiac Life Support (ACLS), Tactical Combat Casualty Care (TCCC), CASEVAC, and more. In addition, SOIDMTs are nationally registered paramedics, and potentially critical and flight paramedic certified. SOIDMTs must perform all the traditional roles of an IDMT, and balance IDMT roles and responsibilities with significant time training for the complex mission of CASEVAC and Prolonged Casualty Care (PCC). SOFME personnel may also receive initial and/or sustainment trauma management training via a SOF-specific training track at Special Operations Center for Medical Integration and Development (SOCMID) at the University of Alabama Level 1 Trauma Center. SOFME personnel train to operate in all types of weather, day or night, including low light or blacked-out conditions. They also acquire specialized tactical skills that are appropriate for the tactical environment and the supported customer. Furthermore, SOFMEs are trained to perform their duties onboard a variety of platforms (rotary, fixed and tilt-wing aircraft, ground vehicles and maritime assets). Thus, SOFME personnel are organized, trained and equipped to effectively operate within austere, low/medium/high-threat dynamic environments.

## FACILITATING CRITICAL SKILLS ADVANCEMENT FOR FUTURE READINESS

Despite their broad mission set and advanced training requirement, the 27th OSM flight constantly looks for ways to improve their capabilities. 27th OSM SOFMEs must bring specialized equipment with them to field environments. While this kit is still smaller than other medical elements, the 27th OSM is finding ways to further reduce it. Reducing the overall footprint of SOFMEs will increase their agility in austere conditions, and make it easier for SOFMEs to go where their patients need them most. This is only one example of the many innovation happenings in the 27th OSM flight.

In individual interview spotlights to follow, 27th Special Operations Support Squadron's Master Sergeant Erik Waldrup and Major Zachary Dreaden explain how the 27th SOW is literally leading the "flight into the future" of SOF medical care.

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## DEPLOYING FULL SPECTRUM MEDICAL CARE ANYWHERE

*Master Sergeant Erik Waldrip is a Special Operations Forces Medical Element Independent Duty Medical Technician-Flight and Critical Care Paramedic assigned to the 27th Special Operations Group at Cannon AFB, NM. He serves as Superintendent, Medical Operations. He provides leadership to the enlisted force and advises the Flight Commander, Squadron Superintendent, Squadron Commander, and First Sergeant on enlisted matters. The Operational Support Medicine, Medical Superintendent's authority is derived from the Flight Commander, and advises Flight Surgeons, Physician Assistant (PA), IDMTs, supervisors and other airmen on morale, discipline, mentoring, well-being, recognition, and the professional development of enlisted airmen. Additionally, he supports casualty evacuation on aircraft of opportunity and provides base operations support to multiple forward locations including medical advisory support for deployed Mission Commanders.*

*Master Sergeant Waldrip spoke with Combat & Casualty Care regarding the myriad assets special operations has in bringing operational support medicine to a truly global battlefield, pushing advances in facility-based treatments to where they needed most: on mission at the point of injury.*

**C&CC: Speak to the 27th Special Operations Support Squadron, Operational Support Medicine Flight and how they answer global need.**

**Master Sgt. Waldrip:** The 27th Operational Support Medicine (OSM) Flight is assigned to the 27th Special Operations Support Squadron (SOSS), Cannon AFB NM. Our mission is to support the 27th Special Operations Wing (SOW) operational mission to include medical care for special operations aircrew and the deployed missions they support.

The 27th OSM Special Operations Forces Medical Element (SOFME) consists of Flight Surgeons, Physician Assistant's, Special Operations Independent Duty Medical Technicians (SOIDMTs), Medical Administration Technicians, and Medical Logistics.

SOFME is the deployable medical element assigned typically to a Special Operations Support Squadron. They are trained in combat trauma medicine, critical care medicine, flying operations, tactics, survival, clinical/global health medicine including Bioenvironmental and Public Health functions. SOFMEs provide initial combat trauma stabilization, Advanced Trauma Life Support (ATLS), Advanced Cardiac Life Support (ACLS), Tactical Combat Casualty Care (TCCC) and special operations Casualty Evacuation (CASEVAC) for injured/ill, joint/coalition and Special Operations Forces (SOF)/conventional forces at forward austere locations.

**C&CC: From a specialized care perspective, what are some focal areas that 27th OSM targets in field care to address the medical needs of SOF mission personnel while keeping clandestine operations on mission?**



### Master Sergeant Erik Waldrip

Medical Operations Superintendent  
27th Special Operations Squadron  
27th Special Operations Group  
Cannon AFB, New Mexico

**Master Sgt. Waldrip:** We have learned through our deployed experience that being at the paramedic level for our SOIDMTs is simply not enough. The expectation at the 27th OSM is that all our SOIDMTs earn the Flight Paramedic and Critical Care Paramedic Certification. The level of complicated patients we may receive and have received while deployed has highlighted that this level of medicine should be the minimum standard. This ensures our SOF personnel are receiving the highest level of care possible and that our medics can identify more advanced complications in our patients.

SOFME has also started recruiting and obtaining board certified Emergency Room Physicians into our units. This is a huge step for our career field as we have learned that the residency trained physician is vital to providing the patient management and expertise necessary when receiving complex casualties while deployed.

It is key to note that these certifications must not just be a piece of paper that says our medics are highly trained. We recently began sending our medics through a program in Las Vegas where they can conduct ride-alongs and provide paramedic level care in



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a busy Emergency Medical Services (EMS) system and they sit on-call for fixed-wing life flight. We also send our members to the Special Operations Center for Medical Integration and Development (SOCMID) on a regular basis either for paramedic refresher or to attend in-hospital rotations.

**C&CC:** In terms of improvements in facility casualty care to the combat environment, what are some of the 27th SOSS/OSM efforts to push knowledge to field operations?

**Master Sgt. Waldrip:** The 27th OSM trains constantly on the full spectrum of medical care. Our SOFMEs are expected to be able to provide point of injury (POI) care, Prolonged Casualty Care (PCC), Casualty Evacuation (CASEVAC) and sick-call clinical operations.

In recent years, we have developed a two week CASEVAC Course that was utilized during the COVID-19 pandemic to train seven SOFMEs on the challenges of providing CASEVAC in a deployed setting. Maj. Zachary Dreaden and I were deployed together in Afghanistan and have significant experience providing CASEVAC to our Special Operations Forces, Joint and Coalition personnel. We are the first unit in the U.S. Air Force Special Operations Command (AFSOC) to develop this course at the unit level and received AFSOC Surgeon General approval to conduct the course on a case-by-case basis.

We have also developed an annual training plan that focuses on items in the U.S. Special Operations Command (USSOCOM) 350-29 Appendix B guidance on what is required to be aligned with the joint



27th Special Operations Support Squadron independent duty medical technicians drag a casualty out of dangerous territory during casualty evacuation training at Cannon AFB, NM. CASEVAC training was previously offered solely at Hurlburt Field, FL, and offering the course at Cannon allows IDMTs to train while preserving resources. (U.S. Air Force photo by Airman 1st Class Christopher Storer)

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force SOF Medic Critical Task List. We train on these tasks every Friday with each quarter having a general overarching focus. For example, quarter one focuses on the basics. We know we can't do advanced medicine and difficult concepts without having a solid foundation on basic TCCC and clinical decision making. These topics progress throughout the year and we put our team in the field to conduct very challenging scenarios.

Furthermore, we have started conducting a 5-day Prolonged Casualty Care exercise here at Cannon biannually. This exercise takes our team out to a field environment where they conduct mission planning, set up a prolonged staging facility and take simulated casualties on 24/7 operations.

Finally, we are integrating into as many joint exercises that we can in order to ensure we are meeting the needs and expectations of the USSOCOM enterprise. We focus our training based on the feedback we get from working with these various teams. We spend a significant amount of time training while also maintaining a team on-call, 24/7 for real world operations and continuous rotations to deployed sites.

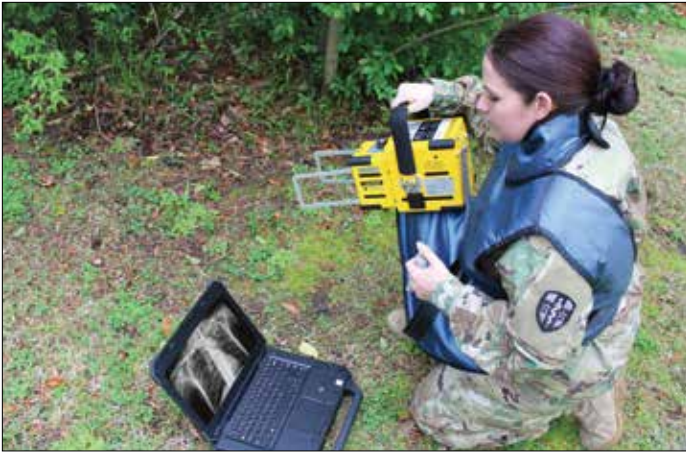
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## ELEVATING OUTCOMES THROUGH ENHANCED PREVENTIVE CARE

*Major Zachary Dreaden serves as the 27th Special Operations Squadron Operational Support Medicine Flight commander and is a Special Operations Forces Medical Element Flight Surgeon and Internal Medicine Provider. He provides leadership to the flight and advises the 27th Special Operations Squadron Commander on operational support medicine matters. The Operational Support Medicine Flight Commander's authority is derived from the Squadron Commander, and advises Flight Surgeons, Physician Assistant (PA), IDMTs, supervisors and other airmen on morale, discipline, mentoring, well-being, recognition, and the professional development of all flight airmen. Additionally, he supports casualty evacuation on aircraft of opportunity and provides base operations support to multiple forward locations including medical advisory support for deployed Mission Commanders.*

*Major Dreaden spoke with Combat & Casualty Care regarding current day focal needs in best preparing special operators for real-world medical care application and partnering to achieve that readiness.*

**C&CC:** As lessons learned in patient outcomes drive better preventive care, talk to any areas of advancement the 27th SOSS/OSM is helping drive in boosting overall force health.

**Maj. Dreaden:** Probably the two most important lessons from our experience in deployed environments are:

Training at home-station should be as realistic as humanly possible. No medical care interventions can be verbalized (every action must be physically performed), training stress needs to be induced, conditions should be similar (night time with red/green lights only, dusty/dirty, load noises, vibrations, etc.), patient handoff need to be performed multiple times, documentation needs to be completed while performing patient care, drawing/diluting/administering medications in appropriate concentrations/routes/timeframes, and all medics on a 2-3 person Special Operations Forces Medical Element (SOFME) team should train to the standard of being able to each care for 1 seriously injured patient. This type of training needs to be frequent (weekly/biweekly) and should be performed in the same gear as would be worn downrange (helmet, vest/plates, red/green lights, night vision goggles, trauma ruck, etc.).

Secondly, SOFMEs with downrange casualty evacuation (CASEVAC) experience are vital to teach the new medics so that lessons learned are not forgotten and similar mistakes are not repeated downrange. These lessons need to be captured in after action reports and used as training scenarios when back at home station. This all leads to the importance of retaining trained SOFMEs.



### Major Zachary Dreaden

Operational Support Medicine Flight Commander  
27th Special Operations Squadron  
27th Special Operations Group  
Cannon AFB, NM

**C&CC:** From a partnering perspective, what are some areas the 27th SOSS/OSM is leveraging shared knowledge with the medical industry to enhance care for special operators?

**Maj. Dreaden:** SOFMEs take advantage of both civilian and military institutions to maintain trauma skills. As mentioned above we send our paramedics to numerous courses and training exercises such as Special Operations Medical Integration and Development (SOCMID), Las Vegas Flight Paramedic coverage, Center for the Sustainment of Trauma and Readiness Skills (C-STARS), Survival, Evasion, Resistance, & Escape (SERE), Advanced Trauma Life Support (ATLS), Advanced Cardiac Life Support (ACLS), Difficult Airway Courses, Wilderness Medicine, Emerald Warrior, Archangel, Trident, and Medic Rodeo. We also support various other Special Operations Forces (SOF) partners during Multi-Lateral Airborne Training events and Full Mission Profiles by both participating in CASEVAC scenarios and providing real-world medical coverage for the exercises.



# REAL WORLD READINESS THROUGH SIMULATED REALITY

Realistic simulation of the human anatomy and the multitude of physiologic responses associated with illness and injury are critical to medical training. It is imperative that the models and simulators utilized during medical training provide sufficient approximation to the human body to ensure mastery of skills being taught. At the Joint Special Operations Medical Training Center (JSOMTC), Ft. Bragg, North Carolina, the Special Operations Soldiers in training put their teammates' lives on the line if they do not have training enabling them to care for patients in a life and death situation.

By SFC Brian Wilkerson (18D), Trauma 1 NCOIC, SFC Tom Dillard (18D) Trauma 3 NCOIC, MSG Seth Elijah (18F), S3 NCOIC, and Mr. Daniel Doerr (18D retired), SFMS director, JSOMTC



Special operations medics assigned to 10th Special Forces Group (Airborne) assess casualty training aids during a medical simulation training exercise at Fort Carson, Colo., April 6, 2017. The training is designed to refine their tactical application of casualty care under fire. The medics practiced their ability to assess, treat, and evacuate a casualty in a controlled environment under the mentorship of senior Group medics. (U.S. Army photo by Staff Sgt. Will Reinier)

The Joint Special Operations Medical Training Center (JSOMTC), which falls under the Special Warfare Medical Group (SWMG), uses a variety of different simulators while training students to replicate medical care in austere environments and under combat conditions. Simulators support training in everything from Advanced Cardiac Life Support (ACLS) to Prolonged Field Care (PFC) to canine combat trauma. The simulators used are primarily in three different blocks in the Special Operations Combat Medic Course: Trauma I & Trauma III and during the Special Forces Medical Sergeants Course.

## TRAUMA I

Students in Trauma 1 utilize a variety of simulators to train on medical skills that cannot be practiced on other students. The main skills the students train using simulators include ACLS, Pediatric Education for Prehospital Professionals (PEPP), and primary medical skills. ACLS, students are trained using a combination of Automatic External Defibrillator (AED) simulators and mannequins. The AED simulator software currently in use is called Realiti360 by iSimulate, which utilizes two iPads, one monitor and one control to mimic a real AED. The instructor can display vital signs and different arrhythmias forcing students to properly interpret and then treat by directing a team to perform treatments on a life-sized mannequin such as Cardio-Pulmonary Resuscitation (CPR), assisted breathing, and simulated defibrillation. During the PEPP training, students use a variety of pediatric mannequins to practice CPR, airway management, birthing and

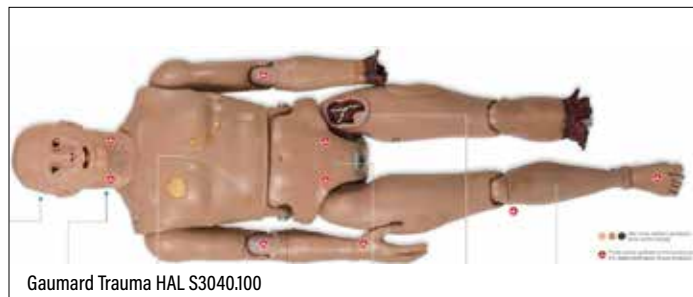
overall pediatric anatomy.

During the longest portion of Trauma 1, students must learn a variety of hands-on-skills such as airway management, needle thoracotomy, and intraosseous infusion, which is taught via mannequins and simulation. Students get multiple repetitions to instill confidence in the variety of skills. For example, to train on airway management, students utilize specialized mannequins that can be intubated and even have inflatable lungs and a stomach to allow for placement checks. The cutting-edge simulators used at the JSOMTC were chosen because they replicate reality as closely as possible and allow students to train and test in a safe, controlled environment.

## TRAUMA III

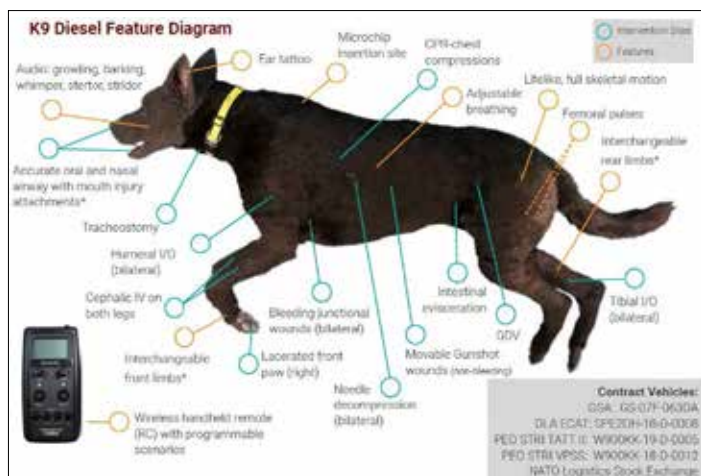
The Gaumard Trauma HAL S3040.100 is the current simulator used in Trauma III for PFC and the Field Training Exercise (FTE). The Trauma HAL is a rugged human trauma patient simulator used for teaching care on the battlefield. HAL's toughness and durability have been proven by independent testing in hot and cold conditions, wet and dry environments, in both fixed-winged aircrafts and military helicopters. HAL is splash-proof, fits in a North Atlantic Treaty Organization (NATO) litter and can be covered with a blanket without overheating. HAL can be rushed from the incident to the Emergency Room or the Intensive Care Unit, while care providers diagnose and treat his condition using real monitoring and resuscitation equipment. HAL realistically transitions between physiologic states in response to

commands from a wireless PC. The Trauma HAL is the only simulator JSOMTC has found that is capable of monitoring ETCO2 and oxygen saturation and provides a 12-lead echocardiogram, which can all be done while using real medical equipment. Additionally, the Trauma HAL provides respiration feedback with impedance pneumography and blood pressure which is monitored in a realistic manner. Finally, the Trauma HAL allows urinary catheterization, and vital signs to respond to physiologic condition and interventions. The Trauma HAL's modularity allows interchangeable arms and legs with various injuries adding to the versatility of simulator.

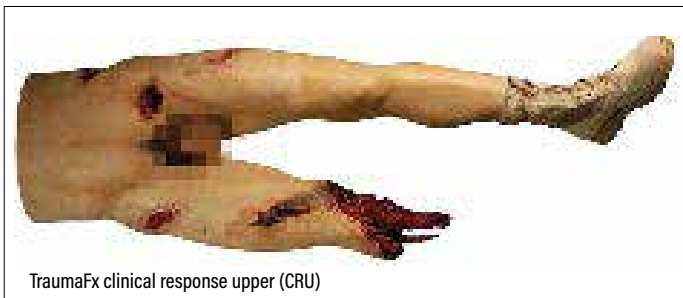


Gaumard Trauma HAL S3040.100

The TraumaFX Advanced Canine Medical Trainer (K9 Diesel) is currently used during the Trauma III FTX. It is a full-body simulator for Operational Canine First Responders, Military Working Dog handlers, Veterinarians and Veterinary Technicians. Designed in partnership with the Department of Defense, K9 Diesel is a state-of-the-art skills trainer that includes active breathing, audio queues and more than 28 different features and medical intervention sites. All training sites are designed to replicate the look, feel and function of actual medical procedures. Interchangeable limbs and injuries provide greater flexibility to vary wound patterns.

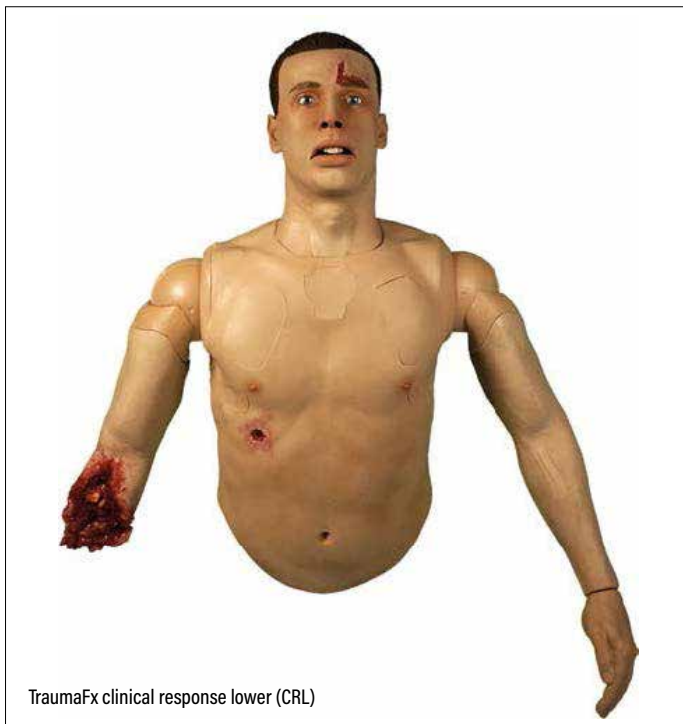


K9 Diesel is the most advanced K9 simulator available and allows students to perform a wide range of critical life-saving tasks with an incredibly realistic experience. K9 Diesel is operated by a long-range wireless controller (RC) which includes real-time data feedback to monitor medical interventions remotely. Light-Emitting Diode (LED) indicators and Liquid Crystal Display (LCD) readouts immediately display key vitals and intervention data, providing instructors with instant feedback on the effectiveness of student procedures. Instructors easily modify features such as pulse rate, pulse strength, breathing speed and strength, bleeding and sounds all through the remote.



TraumaFX clinical response upper (CRU)

The TraumaFX Clinical Response Upper (CRU) medical simulator was created specifically to address the treatment of traumatic upper body injuries and incorporates pulses, breathing, and real-time feedback to create a uniquely realistic training experience for Medics and First Responders. As the student administers treatment, trainers receive instant feedback of performance via the easy-to-use Remote Control for After Action Reporting. The CRU is constructed with a durable urethane core and specially formulated life-like silicone skin and is designed to operate in inhospitable conditions and tough outdoor scenarios. The CRU is an extremely effective multipurpose training tool allowing learners to perform critical life-saving tasks that include maintaining an airway, needle decompression, cricothyroidotomy, intraosseous infusion and chest tube insertion.



TraumaFX clinical response lower (CRL)

The TraumaFX Clinical Response Lower (CRL) is a ruggedized, tetherless, remote-controlled human patient, medical trainer that delivers high-fidelity realism and durability creating the most authentic simulation of traumatic injuries to support the continuum of care, from point-of-injury to a secondary higher echelon of care. The CRL adds to the robust capabilities of the Multiple Amputation Trauma Trainer and Packable Hemostatic Trauma Trainer that delivers a full left leg with a bleeding wound at the inguinal crease for hemostatic wound training, catheterization capabilities and a traumatic amputation of the right leg requiring a tourniquet. This simulator has an animatronics option, creating a moving leg to provide treatment on, making tourniquet application realistic.



## SPECIAL FORCES MEDICAL SERGEANTS COURSE

A lower leg fasciotomy simulator is used to demonstrate, train and evaluate the student's ability to perform a fasciotomy of the muscle compartments below the knee. This simulator provides realistic anatomical location of structures inside the lower leg allowing students to identify the neurovascular areas to avoid, so they can perform the fasciotomy procedure without causing further harm to a patient.

Several different ultrasound and X-ray imaging models (referred to as phantoms) are used to train students on a variety of procedures. The ultrasound models simulate human tissue, either with or without pathology, allowing students to use an ultrasound to identify structures under the skin like nerves, veins and arteries. This allows users to perform invasive procedures safely and effectively (i.e., regional nerve blocks and intravenous access), as well as explore for foreign matter or conduct a deep vein thrombosis. The JSOMTC has both full bodies, lower & upper extremity and torso X-Ray imaging models, allowing students to position a patient properly and take an X-ray image that is clear and readable.

### LOOKING AHEAD

Computerized simulators are critical to medical training. They provide aspects of realism that are impossible to simulate in

any other way, such as with ACLS instruction and testing. These simulators provide a complete range of physiologic responses to both injuries and treatments and allow students to be evaluated on their interpretation of the findings and responses. They force students to make medical assessments and develop treatment plans independent of feedback from the instructor - a critically important skill students must learn in order to operate independently.

The major disadvantage to computerized simulators is that they lack realism when performing procedures such as airway and intravenous/ intraosseous interventions. Once in place, though, the instructor can then input oxygen or fluid therapy, and the "casualty" will respond accordingly. Computerized simulators also do not allow for easy movement without risking damage to either the simulator, computer, or fluid lines. For these reasons, as well as the increased cost of maintenance of these advanced simulators, JSOMTC only uses them for static training scenarios.

Medical training, particularly for special operations forces, must remain challenging and present the most realistic models available for combat medics to become proficient in the evaluation, stabilization and treatment of casualties in the most demanding and austere of environments. To meet this daunting task, the JSOMTC has tested a variety of simulators to best meet the necessary training objectives taught. The challenge continues to be balancing realism with cost, sustainment, and consistency.

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# ANSWERING THE CALL TO PROTECT A NATION

On orders from the White House, the Defense Logistics Agency (DLA) has been working with the U.S. Postal Service (USPS) since mid-January to pack and distribute 500 million free COVID-19 at-home tests to American households.

By Dawn Bonsell, DLA Distribution



Defense Logistics Agency Distribution is receiving COVID-19 test kits at a contracted warehouse in Chambersburg, Pennsylvania, and trans-shipping the test kits to a U.S. Postal Service hub in Phillipsburg, New Jersey. (DLA photo)

In response to the Omicron surge, the White House announced the government would make free rapid tests available to all Americans. The White House tasked the Department of Health and Human Services (HHS) Coordination Operation and Response Element (H-CORE) in the HHS to create a COVID-19 test kit working group, which included members from the Defense Department, HHS's Assistant Secretary for Preparedness and Response, Centers for Disease Control and Prevention, and USPS to implement an end-to-end supply chain to deliver the tests. DLA was tasked with distributing the tests to the USPS for final destination mailing.

On Jan. 19, 2022, the White House launched the website COVIDTests.gov for Americans to request the free at-home COVID-19 tests and, by March 15, DLA Distribution shipped over 388 million ordered tests – 1,461 truckloads – to USPS.

DLA Distribution is receiving and processing up to 82 inbound and outbound truckloads daily, 52 at a DLA Distribution-contracted warehouse in Chambersburg, Pennsylvania; 25 at DLA Distribution San Joaquin, California, and five at a DLA Distribution-contracted warehouse in Marengo, Indiana. A Joint Operations Center provides 24/7 tracking, and existing storage

and distribution contracts are being modified to ensure workers and space requirements can meet the accelerated distribution plan.

"We're grateful for another opportunity to support the nation's fight against the COVID-19 pandemic. I know our team will once again demonstrate its expertise in rapidly distributing critical supplies to mitigate the impacts of this dreadful virus," said Army Colonel Trent Conner, commander of DLA Distribution Susquehanna, Pennsylvania.

## FROM WAREHOUSE TO YOUR HOUSE

As test kits arrive, DLA Distribution workers offload, stage and complete paperwork. Defense Contract Management Agency (DCMA) teams at both warehouses perform quality checks before test kits are sent to USPS service hubs in New Jersey, Maryland, Texas, Indiana and California. From those hubs, the USPS handles fulfillment and shipment of test kits to Americans' doorsteps.

Sixteen DLA Distribution Expeditionary team members from New Cumberland, Pennsylvania, deployed to Chambersburg with DLA Contingency Information Technology and Industrial Engineering Support to set up initial

operations. The expeditionary team remained on-site until systems were in place for about 30 contracted employees who assumed the work in late January. A DLA Distribution expeditionary team from San Joaquin is also helping at the California location, where DLA employees are handling the workload.

Brent Ingraham, executive director of DoD's Joint Rapid Acquisition Cell, visited the Chambersburg warehouse Feb. 8 to tour the operation and thank whole-of-government partners supporting the mission.

"It was an absolute pleasure to witness first hand the professionalism of the DLA and DCMA teams executing such an important mission for the American people. These agencies have been performing exceptionally and there is a direct correlation in their performance to the dedication and sense of service demonstrated daily in these organizations," Ingraham said.

## THE MISSION CONTINUES

DLA Distribution anticipates receiving up to 52 million tests, or 5,200 pallets, every week at both locations until the mission is complete. Outbound shipments will also flow daily to 12 USPS sites.



# WHAT'S THE DIFFERENCE BETWEEN PCR AND ANTIGEN TESTS FOR COVID-19?

A recent online survey found that only 30% of people in the United States know the difference between the two most widely used types of tests for COVID-19: PCR and antigen testing. [1] These tests do not work the same way or deliver the same reliability of results, so understanding this difference is essential to making informed decisions to fight the COVID-19 pandemic.

While some antigen tests can provide rapid results, studies have found them to be less sensitive than PCR tests, and thus they may be less accurate in identifying positive cases. Because of concerns around accuracy, pandemic protocols that involve antigen testing often point to a need for repeated antigen testing over time or confirmation of results through PCR. This staggered process can lead to delayed diagnoses and increased exposure risk.

Based on the technique's established accuracy, lab-based PCR remains the gold standard for COVID-19 testing. Lab-based PCR, however, requires sending samples to a lab for analysis, which can delay the reporting of results. Fortunately, the Thermo Fisher Scientific™ Accula™ SARS-CoV-2 Test delivers accuracy and sensitivity that's in line with lab-based PCR, with

the added convenience of fast results that don't depend on the lab. This system uses a small, mobile docking station that plugs into a standard wall outlet. The Accula Dock doesn't require samples to be processed by a lab and, with a CLIA certificate of waiver, this system can be used outside of traditional healthcare networks.




To learn more about the top 5 factors to consider when choosing between an antigen vs a PCR test, scan the QR code.

1. <https://www.thermofisher.com/blog/clinical-conversations/misconceptions-on-covid-19-tests-hinder-pandemic-response/>

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# PREPARING FOR THE NEXT PANDEMIC

*Colonel Constance L. Jenkins is a native of Indianapolis, Indiana and commissioned to the Army Nurse Corps as a Distinguished Military Graduate of Indiana University - Purdue University at Indianapolis (IUPUI) Army Reserve Officer Training Corps (ROTC) in 1995. She has served in myriad leadership positions encompassing a wide range of experience as a clinician, educator, staff officer, and commander. Key assignments include Branch Manager, Human Resources Command, Fort Knox, Kentucky; Director, U.S. Army Graduate Program in Anesthesia Nursing, Army Medical Department (AMEDD) Center and School, Joint Base San Antonio - Fort Sam Houston, Texas; Director, Talent Management, Office of The Surgeon General, U.S. Army Medical Command, Falls Church, Virginia; and Commander, U.S. Army Medical Activity - Alaska, Fort Wainwright, Alaska. Prior to her current assignment, she served as Chief of Staff, Regional Health Command - Atlantic, Fort Belvoir, Virginia.*

*COL Jenkins is a graduate of the AMEDD Officer Basic Course, AMEDD Officer Advanced Course, Command and General Staff College, and Senior Service College at the Eisenhower School of National Security and Resource Management Strategy, National Defense University. She earned a Master of Science in Nursing from the University of Texas Health Science Center through the U.S. Army Graduate Program in Anesthesia Nursing, and her Doctorate of Nurse Anesthesia Practice from Texas Wesleyan University. She also holds a second Master's degree in National Resource Strategy from the Eisenhower School, National Defense University.*



## COL Constance L. Jenkins

Army Nurse Corps  
Commander

U.S. Army Medical Research  
Institute of Infectious Diseases  
USAMRIID

*COL Jenkins spoke recently with Combat & Casualty Care regarding her command's role as a U.S. Defense Department leader in the ongoing fight against COVID-19, and the ways in which USAMRIID uses lessons learned from the pandemic to prepare for the next emerging biothreat.*

**C&CC: Please describe how USAMRIID has been a unique strategic asset for the Army and the Department of Defense for over 50 years.**

**COL Jenkins:** USAMRIID enjoys a proud history of supporting Warfighter Readiness through medical research on current and emerging biological threat agents. Our "end to end" biodefense capability starts with biosurveillance, a critical element in mitigating emerging threats. We provide timely and actionable surveillance information to Combatant Commands and other interagency partners. As a national reference laboratory, we have the ability to receive unknown biological agents, rapidly identify the threat, and provide extensive pathogen assessment consultation. Finally, our technology base enables the timely development of medical countermeasures aimed at detection, prevention, and treatment.

Since our inception in 1969, USAMRIID has fielded hundreds of diagnostic tools, produced dozens of vaccine and therapeutic candidates, and responded to outbreaks around the globe, such as Ebola virus disease in Western Africa and the COVID-19 pandemic. Our scientists are internationally renowned, providing world-class expertise in molecular and cell biology, microbiology, clinical infectious diseases, veterinary pathology, and laboratory animal medicine. USAMRIID's vital teaching and education mission instructs the Joint Force and other Federal agencies in detecting and managing biological casualties in clinical and field environments in support of DoD operational requirements.

**C&CC: As Commander, what are your top priorities for the USAMRIID organization, and how do they align with Army and DoD priorities?**

**COL Jenkins:** USAMRIID's remarkable mission, to provide leading edge medical capabilities to deter and defend against current and emerging



biological threat agents, highlights why investing in our people is a top priority. Scientific advancement starts with people questioning the nature of things, sharing ideas, and tackling challenging problem sets. Computers enable science, but they cannot replace the intellectual curiosity that ultimately propels us to pursue and investigate, leading to innovative solutions and discoveries along the way. We have significantly invested in how we recruit, develop, and retain our highly specialized and talented workforce. Staff investment includes development of expertise through education and work experience, as well as providing opportunities to exercise greater leadership and responsibility. Our mission success is achieved through multidisciplinary teams focused on a common goal of addressing the complexities of emerging and current biological threats and the associated medical countermeasure development.

Innovation through modernization to maximize Warfighter Readiness and Lethality requires Force Health Protection from both traditional and modified biological warfare and endemic disease threats. In the future, effective broad-spectrum medical countermeasures will allow troops to operate in environments containing high-threat pathogens, conferring substantial advantage to our Warfighters and deterring use of biological threats by potential adversaries. This capability supports the U.S. Army and Department of Defense priority to modernize: to bring greater capacity and capabilities over the long term to guarantee overmatch in future conflicts. To ensure Readiness and Lethality, the evolving nature of potential biological threats compels a continuous assessment of the capabilities we offer to the Force. Emerging threats, whether they occur naturally (through evolutionary pressure) or through an adversary's exploitation (using synthetic biology), foster the need to expand and mature diagnostic, genomic, bioassay, and imaging technologies.

**C&CC:** Please tell us about some of USAMRIID's recent successes, including your research on SARS-CoV-2, the virus that causes COVID-19.

**COL Jenkins:** USAMRIID continually balances the day-to-day mission of protecting Warfighters with the need to respond quickly to emerging threats. Most recently, we were one of the few U.S. research laboratories to continue its current research portfolio while contributing to the COVID-19 knowledge base. We developed multiple foundational animal models for testing vaccines, therapeutics and diagnostics. These included the first lethal disease model (in mice), the Syrian hamster model that was selected by Operation Warp Speed for rapid testing of therapeutics, and several nonhuman primate models. We were one of the first laboratories to quickly develop and validate imaging techniques to visualize the novel coronavirus in animal tissues, and we created highly sensitive assays to assess the efficacy of medical countermeasures in animal models. Working with industry partners, we tested multiple drug compounds using high-throughput screening to quickly identify candidates with potential activity against SARS-CoV-2. This body of work supports the development and evaluation of vaccines, diagnostics, and therapeutics to satisfy U.S. Food and Drug Administration requirements.

USAMRIID has played a pivotal role in the testing and validation of nearly every Ebola virus vaccine and therapeutic to date, thanks to our unique facilities, subject matter expertise, and ability to provide critically needed epidemiologic data. Scientists at USAMRIID used a technology called Next-Generation Sequencing to unlock important information about the spread of Ebola virus during the 2014–2016 outbreak in Western Africa—the largest of its kind since the virus was first discovered in 1976. USAMRIID performed the first comprehensive genomic analysis



LTC Vanessa Melanson, an Army reservist working at the U.S. Army Medical Research Institute of Infectious Diseases, Fort Detrick, Md., prepares an assay for genome sequencing of SARS-CoV-2, the virus that causes COVID-19. USAMRIID pioneered the BMASS (Biodefense Mass Sequencing and Surveillance) method for detecting a broad array of biological threats to the Warfighter. (Photo by John W. Braun, USAMRIID)

of Ebola virus sequences from Liberia, tracing the introduction and spread of the virus and shedding light on how the virus moved between the neighboring countries of Guinea and Sierra Leone. In a separate, groundbreaking study, USAMRIID also confirmed for the first time that Ebola virus can be sexually transmitted. These studies were made possible by the in-country laboratory capability established by USAMRIID in collaboration with the Liberian Institute for Biomedical Research and the Liberian Ministry of Health and Human Welfare. Recently, we demonstrated (in an animal model) that Ebola virus can hide in immune-privileged sites in the brains of survivors—confirming what has been suspected for some time in humans.

Viral genome sequencing helps us to better understand general patterns of spread, and informs efforts to control future outbreaks. It also allows for examination of genetic mutations that may affect the virus's ability to survive and cause disease. Using these sequencing tools, USAMRIID developed a large-scale surveillance method for SARS-CoV-2. Our patented approach, Biodefense Mass Sequencing and Surveillance (BMASS), has the potential to provide the throughput necessary to overcome testing shortfalls, while shifting the supply chain away from standard assays and alleviating the logistics burden. BMASS can scale up from 10,000 samples to over 40,000 samples per run, depending on the sequencing platform, using instruments already in place in DoD laboratories. We've also designed an assay to allow for simultaneous testing of samples for Influenza A and B strains, along with SARS-CoV-2, that can test more than 1,500 samples per run. BMASS is a rapid-turnaround, cost-effective way to screen large military populations for COVID-19, and the technology can be used to look for multiple diseases at the same time—meaning its potential extends far beyond the current pandemic.

**C&CC:** Clearly, biological threats and infectious diseases are not just issues of military and public health, but of national security as well; how is USAMRIID preparing to fight the pandemic after next?

**COL Jenkins:** Synthetic Biology is a rapidly developing focus area that provides powerful tools for understanding emerging biological



The U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) develops diagnostic tests to identify biological threats and emerging diseases and evaluates them in laboratory and field settings. Investigator Dr. Keersten Ricks programs software to scan a lateral flow test to determine sample positivity for COVID-19 antibodies. Research conducted at USAMRIID leads to medical solutions – vaccines, drugs, diagnostics, information, and training programs – that benefit both military personnel and civilians. (Photo by John W. Braun, USAMRIID)

threats. Acquiring viral stocks during outbreaks can be difficult for logistical, safety, and political reasons. USAMRIID's Center for Genome Sciences (CGS) maintains a full suite of synthetic biology tools and has developed methods to recapitulate naturally occurring viruses when clinical samples cannot be obtained. Our reverse genetics capability reduces the ability of adversaries to deny access to biological samples during an outbreak. This technology also enables us to identify the major determinants of virus transmission, pathogenesis and human adaptation, while allowing us to examine the efficacy of medical countermeasures against the evolving virus.

In addition to providing operational support for outbreak response, the CGS conducts and supports training, basic research, advanced development, and testing & evaluation for any pathogen(s) encountered, whether naturally occurring, modified, or weaponized. USAMRIID is the Department of Defense's only Biosafety Level 4 (BSL-4) research and clinical laboratory, with extensive BSL-2 and BSL-3 assets as well. Our Special Pathogens Laboratory is fully accredited and can provide definitive diagnostic support and characterization for any pathogen. The CGS has leveraged these in-house capabilities to support outbreak response across the globe for over a decade, using state-of-the-art whole genome sequencing expertise to support investigations of Ebola virus, Andes virus, Zika virus, and many others. Most recently, we have been supporting the Defense Health Agency (DHA) Global Emerging Infections Surveillance (GEIS) network, performing variant characterization in support of COVID-19 pandemic response.

**C&CC: The U.S. Army Medical Research and Development Command, USAMRIID's higher headquarters, is slated for transition to the Defense Health Agency later this year; do you see the move to DHA changing the way USAMRIID operates?**

**COL Jenkins:** Initially, I would not expect to see any substantial changes to USAMRIID operations with the transition to DHA, as USAMRIID has a unique mission and already provides support to the other Services and

agencies across the DoD. With any transition, of course, one can expect changes in policies and procedures to enhance communication, reduce duplication of effort, and streamline processes to improve efficiencies across the organization.

**C&CC: In this era of fiscal constraint, how do you balance USAMRIID's funding challenges and research priorities?**

**COL Jenkins:** While biodefense spending has seen increases over the years, recent budget constraints mean the U.S. government must ensure maximum productivity with minimal duplication across research agencies. Within the context of this competitive environment, USAMRIID continues to transform itself to meet both today's and tomorrow's challenges. We have implemented deliberate, thoughtful solutions enabling data-driven decisions, leading to improved efficiencies, broad stakeholder engagement and investment, and decisive management of our research portfolio, human capital, and physical assets. Combined with sound fiscal stewardship, these practices aid in meeting cost, schedule, and performance timelines—earning USAMRIID a reputation not only for advancing the science, but also for optimizing the return on investment in biodefense.

**C&CC: Is there anything else you'd like our readership to know about USAMRIID?**

**COL Jenkins:** Our workforce, composed of military personnel, Army civilians, and contractors, has a combined skill set that you won't find anywhere else in the DoD or the United States. USAMRIID has some of the world's leading experts on pathogens of military concern, and we also have the tools and expertise to respond to emerging threats. In addition, we've built partnerships over decades with industry, academia, other Services, and domestic and international government agencies. Our team is dedicated to the mission of protecting Warfighters and advancing medical countermeasures that also benefit public health.



## MHS GENESIS ROLL-OUT ON A ROLL

A major milestone for the Defense Health Agency in 2021 was to advance the successful rollout of MHS GENESIS, the new electronic health record system deploying to military hospitals and clinics around the world. The MHS GENESIS system is the centerpiece of a larger transformation to securely standardize, integrate and manage medical records across the Department of Defense and the Department of Veterans Affairs. Army Lt. Gen. (Dr.) Ronald Place, the DHA's director, highlighted the rollout's progress among the agency's "top six points of pride" across 2021.

"I am immensely proud of the collective work across the entire Military Health System to continue deploying MHS GENESIS during the pandemic," Place said. "It is much more than a single electronic health record that stays with a patient during their entire life cycle in the MHS and VA. It is transformative by design to help us improve patient safety, communication and ultimately better health outcomes."

Military Health System facilities worldwide began deploying MHS GENESIS in 2017, in 23 iterations, or 'waves.' In 2022, the system will pass a key milestone: implementation of MHS GENESIS in more than half of all military hospitals and clinics.

### MORE MAJOR SUCCESSES

Like Tripler, there were other major MHS GENESIS successes in 2021. "We deployed at three successful waves, including 30 military hospitals and clinics," said Air Force Col. (Dr.) Thomas Cantilina, the DHA's chief health informatics officer and deputy functional champion for the electronic health records system. "Currently, MHS GENESIS has been deployed at 47 MTF commands, which includes 64,000 active users and represents 35% of the Department of Defense deployment," Cantilina said.

In parallel, the team has continually upgraded the system to keep it current with the commercial model, which includes thousands of underlying code updates as well as hundreds of user interface improvements, he said. As part of DHA's broad response to the COVID-19 pandemic, MHS GENESIS supported patient and agency needs. The new electronic health record system provided military leaders with real-time data and information about the DHA's capacity to take on new patients from an enterprise level, the CIO said. "DHA health informaticists added approximately 40 new system functions to MHS GENESIS, enabling providers to better address the needs of patients with presumptive positive cases of COVID-19," said Cantilina. They also added several systems to support MHS GENESIS and MHS operations, including:

- A file-sharing protocol that supports a secure email interface to comply with the 1996 Health Insurance Portability and Accountability Act (HIPAA).
- The MHS Video Connect feature, which is a platform supporting virtual video visits between MHS patients and providers.
- Two platforms designed to connect and transform electronic health records data to leverage machine learning to better understand common trends in the MHS patient population.

- A new MHS GENESIS Revenue Cycle Expansion, or RevX, a system designed to integrate clinical business systems that drive standard processes. RevX will help enable accurate resource management. "Our team is working to advance RevX at military hospitals and clinics already using MHS GENESIS, and we're excited by the advancements it will bring to the MHS once all of our military hospitals and clinics transition to MHS GENESIS," said Cantilina.

### MHS GENESIS IN 2022

Cantilina and the rest of the DHA teams involved in the rollout expect to deploy MHS GENESIS at another 10 waves, during 2022, including 54 additional military hospitals and clinics. "This will be our largest group of military hospitals and clinics in any calendar year," said the CIO. For patients, this means access to the improved MHS GENESIS Patient Portal, which allows online scheduling and secure messaging to providers, as well as increased security protocols for sensitive health data.

More info: [Army.mil](http://Army.mil)

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## EMPLOYING NEURO THERAPY TO MINIMIZE NEURO ILLNESS

The Systems-Based Neurotechnology for Emerging Therapies (SUBNETS) program aims to improve force health by using neurotechnology as the basis for effective, informed, and precise treatments for neuropsychiatric illnesses in military Servicemembers. The effects of such illnesses, brought on by war, traumatic injuries, and other experiences, remain challenging to treat. Current treatment approaches—surgery, medications, and psychotherapy—can often help to alleviate the worst effects of illnesses such as major depression and post-traumatic stress, but they are imprecise and not universally effective. SUBNETS is designed to advance neuropsychiatry beyond the realm of dialogue-driven observations and into the realm of therapy driven by quantifiable characteristics of neural state. In doing so, the program would create one of the most comprehensive datasets of systems-based brain activity ever recorded, leading to informed and precise neurotechnological therapy to produce major improvements in quality of life for Servicemembers and veterans with neuropsychological illness who have very few options with existing therapies. Through SUBNETS, DARPA seeks to generate the knowledge and technology required to deliver relief to patients with otherwise intractable neuropsychiatric illness.

The SUBNETS vision is distinct from current therapeutic approaches in that it seeks to create an implanted, closed-loop diagnostic and therapeutic system for treating, and possibly even curing, neuropsychiatric illness. That vision is premised on the understanding that brain function—and dysfunction, in the case of neuropsychiatric illness—plays out across distributed neural systems, as opposed to being strictly relegated to distinct anatomical regions of the brain. The program also aims to take advantage of neural plasticity, a feature of the brain by which the organ's anatomy and physiology alter over time to support normal brain function. Because of plasticity, researchers are optimistic that by using SUBNETS-developed technology the brain can be trained or treated to restore normal functionality following injury or the onset of neuropsychiatric illness.

Through measuring pathways involved in complex systems-based brain disorders including post-traumatic stress, major depression, borderline personality, general anxiety, traumatic brain injury, substance abuse and addiction, and fibromyalgia/chronic pain, SUBNETS pursues the ability to record and model how these systems function in both normal and abnormal conditions among volunteers seeking treatment for unrelated neurologic disorders and impaired clinical research participants. SUBNETS uses these models to determine safe and effective therapeutic stimulation methodologies. The models will be adapted onto next-generation, closed-loop neural stimulators that exceed currently developed capacities for simultaneous stimulation and recording, with the goal of providing investigators and clinicians an unprecedented ability to record, analyze, and stimulate multiple brain regions for therapeutic purposes.

More info: [DARPA.mil](http://DARPA.mil)

## ADVANCES IN NEURAL INTERFACING ENHANCING PROSTHETIC CAPABILITIES

Improved technology for military uniforms, body armor, and equipment saves the lives of thousands of Servicemembers injured on the battlefield. Unfortunately, many of those survivors come home seriously and permanently wounded, suffering unprecedented rates of limb loss and traumatic brain injury. This crisis has motivated great interest in the science of and technology for restoring sensorimotor functions lost to amputation and injury to the central nervous system. For more than a decade, DARPA has led efforts aimed at revolutionizing the state of the art in prosthetic limbs, yielding two advanced mechatronic limbs for the upper extremity. These new devices are truly anthropomorphic and capable of performing dexterous manipulation functions that finally begin to approach the capabilities of natural limbs. However, in the absence of a high-bandwidth, intuitive control interface for these limbs, they will not achieve their full potential to improve quality of life for wounded troops.

DARPA launched the Reliable Neural-Interface Technology (RE-NET) program in 2010 to directly address the need for high-performance neural interfaces to control the dexterous functions made possible by DARPA's advanced prosthetic limbs. Specifically, RE-NET seeks to develop the technologies needed to reliably extract information from the nervous system, and do so at the scale and rate necessary to control many degree-of-freedom machines. Prior to RE-NET, all existing methods to extract neural-control signals were inadequate for amputees to control high-performance prostheses, either because the level of extracted information was too low or the functional lifetime of the interface was too short.

Ongoing technological advances create new opportunities to solve both of these traditional problems with neural interfaces. For example, it is now feasible to develop high-resolution peripheral neuromuscular interfaces that increase the amount of information obtained from the peripheral nervous system. Furthermore, advances in cortical microelectrode technologies are extending the durability of neural signals obtained from the brain, making it possible to create brain-controlled prosthetics that remain useful over the lifetime of the patient.

The RE-NET program is divided into three complementary efforts aimed at understanding why the performance of neural interfaces degrades over time and developing new high-performance neural interfaces that last the life of the patient:

- Histology for Interface Stability Over Time
- Reliable Central Nervous System Interfaces
- Reliable Peripheral Interfaces

Ultimately, DARPA seeks to develop clinically viable technologies that provide neural control of state-of-the-art prosthetic limbs to amputees and people with spinal cord injuries and neurological diseases that restrict movement.

More info: [DARPA.mil](http://DARPA.mil)



## COUNTERING MULTI-NATURED THREATS TO PHYSIOLOGICAL FUNCTION

The Microphysiological Systems (MPS) program supports military readiness by enabling timely evaluation of the safety and efficacy of novel medical countermeasures against a wide range of natural and man-made health threats, including emerging infectious disease and chemical or biological attack. Testing these types of countermeasures is particularly challenging using current methods because it is often both unethical and impractical to evaluate countermeasures using human clinical trials. Instead, the U.S. Food and Drug Administration (FDA) must base its determination of efficacy and toxicity on data from animal studies, despite the fact that animal models have limited relevance to humans and poorly predict effects in humans. To overcome this challenge, the MPS program is developing in vitro platform technology to rapidly assess medical countermeasures in a way that is relevant to human health using interlinked "organoid" systems that incorporate engineered human tissue and microfluidics technology into microchips that mimic the functions of human physiological systems.

MPS performer teams are working specifically to develop a reconfigurable platform that permits simultaneous study of ten or more interlinked in vitro physiological systems, arranged in any sequence, with the ability to sustain tissue for up to four weeks

to evaluate effects of countermeasures over time. The teams must demonstrate that the engineered tissues function together to accurately reproduce both the human physiological systems they are intended to mimic and the biological crosstalk that occurs among systems. To validate the platform's predictive ability, teams are testing compounds with known effects in humans. Related research is applying infectious agents to the platform to understand if the physiological effects of health threats can be modeled to facilitate development of new countermeasures.

DARPA involved the FDA from the beginning of the MPS program to help ensure that regulatory challenges of reviewing drug safety and efficacy are considered during development of the MPS platform. DARPA is also coordinating efforts with the National Institutes of Health, which is conducting separate but parallel research.

If the MPS program is successful, the resulting platform should decrease the time for development and increase the number and quality of medical countermeasures to bio-threat agents that move through the FDA pipeline and into clinical care.

More info: [DARPA.mil](mailto:DARPA.mil)

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# BOOSTING PROLONGED FIELD CARE

The challenges of modern future operability supporting Multi-Domain Battle (MDB) and Large-Scale Combat Operations (LSCO) will be measured by efficiency in medical evacuation and the optimization of positive casualty outcomes despite extended field time.

By Frederick Gerber (COL, USA Ret), Former Commander, 307th Medical Battalion, 82nd Airborne Division and Senior Military Consultant, Thornhill Medical



MOVES® SLC™, by Thornhill Medical, is awarded U.S. Army Airworthiness Release, adding to its growing credentials. MOVES® SLC™ extends the critical care window on the battlefield of today and tomorrow. The micro-integrated technology combines an oxygen concentrator, a unique O<sub>2</sub>-conserving ventilator, suction and complete vital signs monitoring in a single, rugged, portable, battery-powered unit without the need for heavy, dangerous oxygen tanks. (CNW Group/Thornhill Medical)

As a Medical Battalion Commander in the 82nd Airborne Division during Operation Desert Storm in the early 1990s, my team faced complex demands of accumulating trauma patients amid intense staffing and equipment challenges. In one situation, we encountered a large mass casualty incident, followed by a steady stream of inbound casualties – most requiring critical care vital signs monitoring, oxygen, suction, ventilation and other resource intense operations. Clinical staff and equipment resources quickly outstretched our ability to hold large numbers of patients after resuscitating and stabilizing patients over an intense 96-hour period.

## EVOLVING PROLONGED CARE NEEDS

Now, as the modern battlefield evolves to Multi-Domain Battle (MDB) and Large-Scale Combat Operations (LSCO), the need is more urgent than ever for practical solutions that address the unique demands of treating, holding, and evacuating casualties. The new

Joint Trauma System (JTS) 2021 Prolonged Care doctrine acknowledges gaps in current patient holding requirements extending beyond the traditional “Golden Hour” to a holding window of up to 96 hours—and beyond. The new Clinical Practice Guidelines identify significant clinical capabilities required to support the future MDB, given resilient, mobile, dispersed, integrated, and survivable medical forces.

This is a topic explored in a recent webinar entitled “Future Readiness: Medical Battlefield Operations & U.S. Army Multi-Domain Operations (MDO)”, in which Will Schiek, (COL, USA MSC Ret) and I examined future battlefield operating concepts and their implications for future battlefield medicine.

## FUTURE READINESS: TECHNOLOGY AS A FORCE-MULTIPLIER

Increasingly apparent is the crucial role information and advanced technology can and will play in addressing these gaps.

A February 2022 White Paper examines how MOVES® SLC™ by Thornhill Medical aligns to the new MDB Prolonged Care doctrine. In “Extending Lifesaving Capability, Operational Reach, and Evacuation Capability”, author and clinical consultant Randall M. Schaefer (LTC, USA Ret., DNP, RN, ACNS-BC, CEN) explores capability gaps in complex scenarios and assesses the role commercial-off-shelf (COTS) devices play.

According to Schaefer, “MOVES® SLC™ represents an FDA-approved COTS materiel solution directly supporting current and future operational scenarios to extend lifesaving capability, operational reach, and evacuation capabilities...directly supporting efforts to close capability gaps identified in PCC Capability Based Assessments.”

As MDB operations and LSCO dominate the future battlefield, mobile, rugged and interoperable medical technology solutions play a vastly important role in extending the critical care window and serving as a force-multiplier in these environments.

More info: [thornhillmedical.com/military](https://thornhillmedical.com/military)

## MOVES® SLC™ ON THE MOVE

Developed by Thornhill Medical in partnership with the U.S. Defense Department, MOVES® SLC™ is a micro-integrated critical care platform combining an oxygen (O<sub>2</sub>) concentrator, an O<sub>2</sub>-conserving ventilator, suction, and comprehensive vital signs monitoring in a single compact, rugged, portable, battery-operated system which fits on a North American Treaty Organization (NATO) litter. MOVES® SLC™ has fleet-wide U.S. Army Airworthiness Release (AWR) certification and was recently showcased in a U.S. Telemedicine & Advanced Technology Research Center (TATRC) Technology in Disaster Environments demonstration.



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### CALENDAR OF EVENTS

**MAY 2 - 6**

**SOMA**  
Raleigh, NC  
[Specialoperationsmedicine.org](http://Specialoperationsmedicine.org)

**MAY 4 - 5**

**DoD/VA & Gov Health IT**  
National Harbor, MD  
[lehrsummit.dsigroup.org](http://lehrsummit.dsigroup.org)

**MAY 10 - 12**

**Modern Day Marine**  
Washington, DC  
[Marinemilitaryexpos.com](http://Marinemilitaryexpos.com)

**MAY 16 - 19**

**SOFIC**  
Tampa, FL  
[Sofic.org](http://Sofic.org)

**JUN 8 - 9**

**Warfighter Systems Summit**  
National Harbor, MD  
[Futurewarfighter.dsigroup.org](http://Futurewarfighter.dsigroup.org)

**JUN 16 - 17**

**Navy Contracting Summit**  
Norfolk, VA  
[Usdlf.org/navycontractingsummit](http://Usdlf.org/navycontractingsummit)

**JUL 27 - 28**

**AUSA Warfighter Summit & Expo**  
Fayetteville, NC  
[Ausa.org/warfighter](http://Ausa.org/warfighter)

**SEP 12 - 15**

**MHSRS**  
Kissimmee, FL  
[Mhsrs.amedd.army.mil](http://Mhsrs.amedd.army.mil)

**SEP 27 - 29**

**Pacific Contracting Summit**  
Waikiki Beach, HI  
[Usdlf.org](http://Usdlf.org)

**OCT 10 - 12**

**AUSA Annual Meeting**  
Washington, DC  
[Ausa.org](http://Ausa.org)

**JAN 17 - 29, 2023**

**SHOT SHOW**  
Las Vegas  
[Shotshow.org](http://Shotshow.org)

**FEB 12 - 18**

**AMSUS Annual Meeting**  
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- > DLA DAPA Agreement: SP0200-03-H-0008
- > DLA VIPA Agreement: VMP-1412-03
- > FSS Contract 6511a/GSA Schedule-V797D-30127

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