U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND

2022

COMMAND ACCOMPLISHMENTS

- **U.S. Army Aeromedical Research Laboratory**
  USAARL
- **U.S. Army Institute of Surgical Research**
  USAISR
- **U.S. Army Medical Materiel Development Activity**
  USAMMDA
- **U.S. Army Medical Research Institute of Chemical Defense**
  USAMRICD
- **U.S. Army Medical Research Institute of Infectious Diseases**
  USAMRIID
- **U.S. Army Research Institute of Environmental Medicine**
  USARIEM
- **Walter Reed Army Institute of Research**
  WRAIR
- **Congressionally Directed Medical Research Programs**
  CDMRP
- **Telemedicine and Advanced Technology Research Center**
  TATRC

USAMRDC Educational Outreach Supports Development of Young Scientists

In 2022, the U.S. Army Medical Research and Development Command prioritized the growth and development of future scientists through educational outreach efforts.

The Gains in Education of Mathematics and Science program strives to excite and educate students about STEM and associated STEM careers to meet the long-term national defense needs of the Nation.

The 2022 GEMS program hosted 1,584 students at four separate week-long sessions designed to promote science, technology, engineering and mathematics to young people across the country in grades four through 11. MRDC headquarters, along with the command's Walter Reed Army Institute of Research, Aeromedical Research Laboratory, Research Institute of Environmental Medicine and the Medical Research Institute of Chemical Defense hosted activities and experiments such as building robots, programming video games and isolating DNA strands.

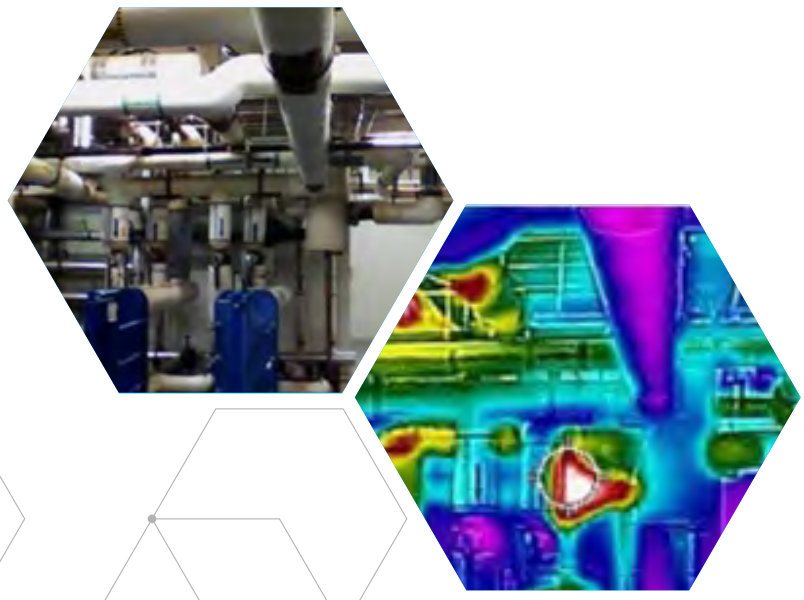
G9 Supports, Drives USAMRDC Mission Across the Command

The U.S. Army Medical Research and Development Command's Deputy Chief of Staff for Facilities provides subject matter expertise and policy on all facility issues, assisting leadership on facility requirements, sustainment, utilities management, project development and execution, construction and demolition.

At USAMRDC's Institute of Surgical Research, four sublevel mechanical rooms were exhibiting high temperature and humid conditions, both of which posed hazards to maintenance staff and equipment. The existing fan coil units were replaced with new, properly sized, digital controls which added fresh air ventilation for all four mechanical rooms. The four existing water circulating pumps were also replaced. These repairs resulted in a reduction of heat and humidity in the mechanical rooms and a significant energy savings.

At USAMRDC's Research Institute of Environmental Medicine, the Enviro Vac waste system within the hypobaric chamber, which is designed to remove waste during operations and track the atmospheric pressure to appropriately flush waste, had exceeded its useful life. G9 supported the installation of a new state-of-the-art, fully automated system which is connected to the building automation system. The new system includes modern safety controls and warning alarms as well as a remote operation station.

At USAMRDC's Walter Reed Army Institute of Research, three model centrifugal chillers were found to be leaking. G9 supported a comprehensive overhaul to correct all known deficiencies, and further performed in-depth investigation so the chillers could continue to support the building, occupants and the research mission. Early detection and corrections of these and other deficiencies extended the life of the chillers and significantly reduced the chance of an unforeseen outage, loss of chilled water or excess energy usage.



Animal Lab Scores 100% Pass Rate for Veterinary Residents

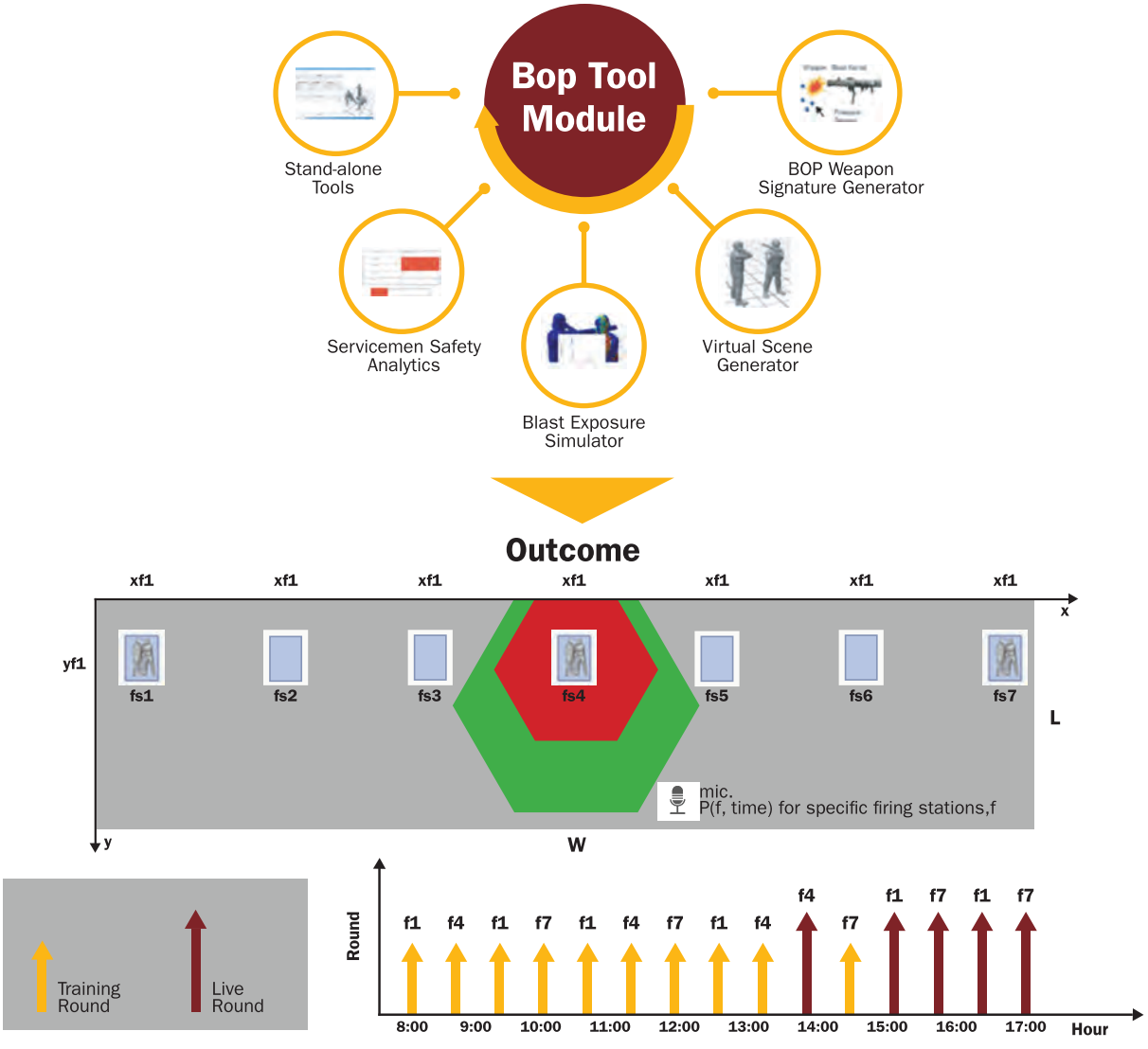
Support from the U.S. Army Medical Research and Development Command's Animal Care and Use Review Office to the Army's Laboratory Animal Medicine Residency Program resulted in a 100 percent pass rate for 64C veterinary residents taking the LAM board examination. All six residents passed their boards in 2022. ACURO, a component of USAMRDC's Office of Human and Animal Research Oversight, provides oversight of the implementation of command, Army and DOD policies regarding the use of animals in research, development, testing, evaluation and training. ACURO's responsibility for laboratory animal welfare extends to MRDC-managed contracts and grants involving animals conducted or supported by the DOD.

In Bid to Minimize Training Injuries, BIRCO Develops Blast Exposure Monitor

The DOD Blast Injury Research Coordinating Office has developed a proof-of-concept Blast Overpressure tool that aids in safer weapons training. The tool has two modules.

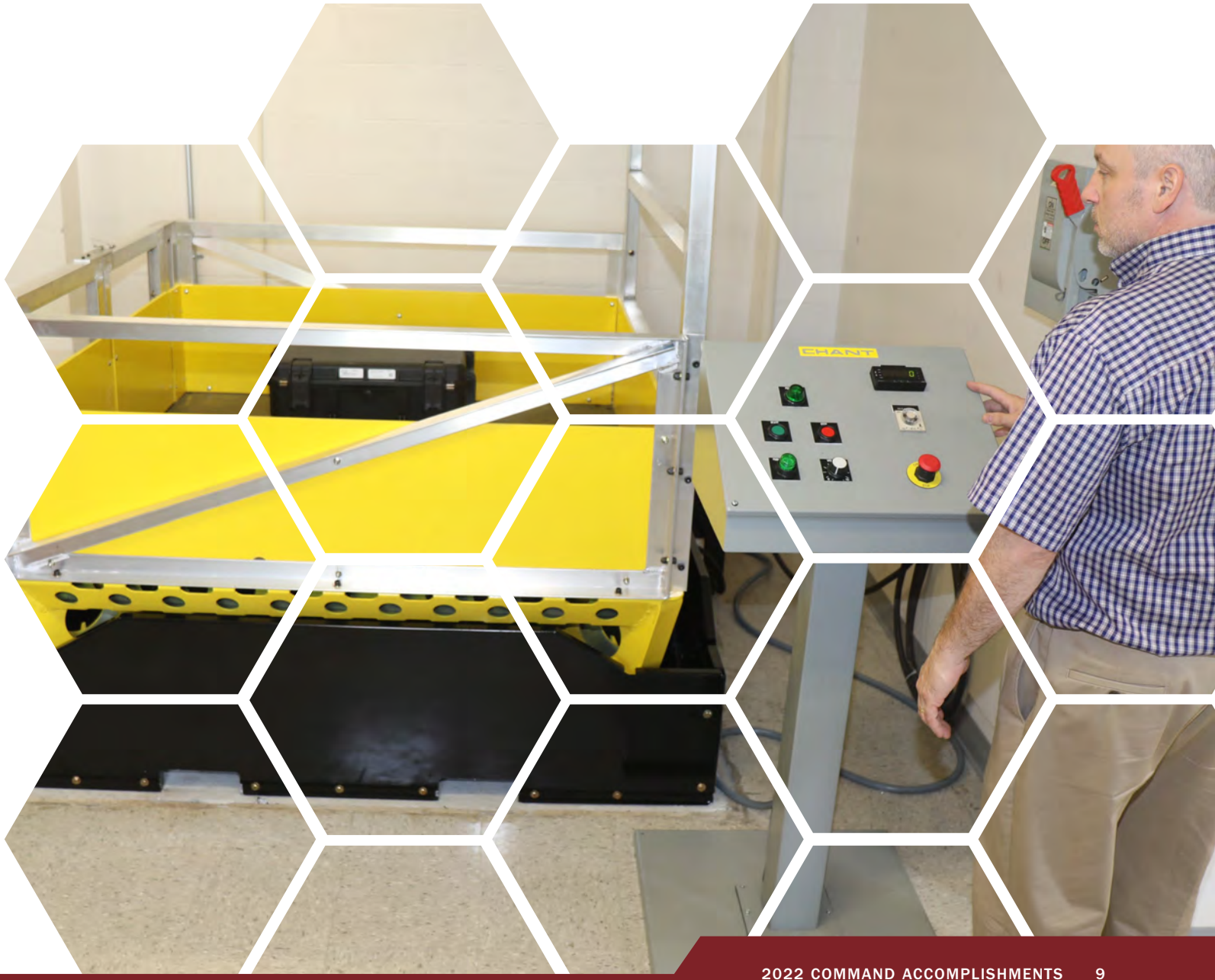
The BOP-Scene module provides instructors and Service Members with an interactive, visual presentation of blast loads during weapon firing and shows how to minimize the blast dose by adjusting postures and personal protective equipment.

The BOP-Site module predicts and graphically displays blast overpressure and cumulative impulse from repeated weapon firing on the entire training site. BIRCO coordinates and manages the medical research efforts and programs of the DOD relating to the prevention, mitigation and treatment of blast injuries. The U.S. Army Medical Research and Development Command is responsible for the program's day-to-day coordination and management activities due to its unique position and expertise.



USAMRDC Test Branch Enhances, Refines Medical Device Modernization

The U.S. Army Medical Research and Development Command's Test Branch provides early developmental testing of medical products focusing on environmental and ruggedness testing, designed to determine the product's ability to be used in a military environment. In 2022, the Test Branch evaluated 16 devices for fielding. Developmental testing by the Test Branch supported multiple successful procurement decisions for modernized medical equipment. Army healthcare providers use modernized medical devices to support Warfighters in deployed environments, maintain operational readiness and save lives.



Bio-Tech Without Borders: USAMRDC Project Saves Lives in Ukraine Conflict

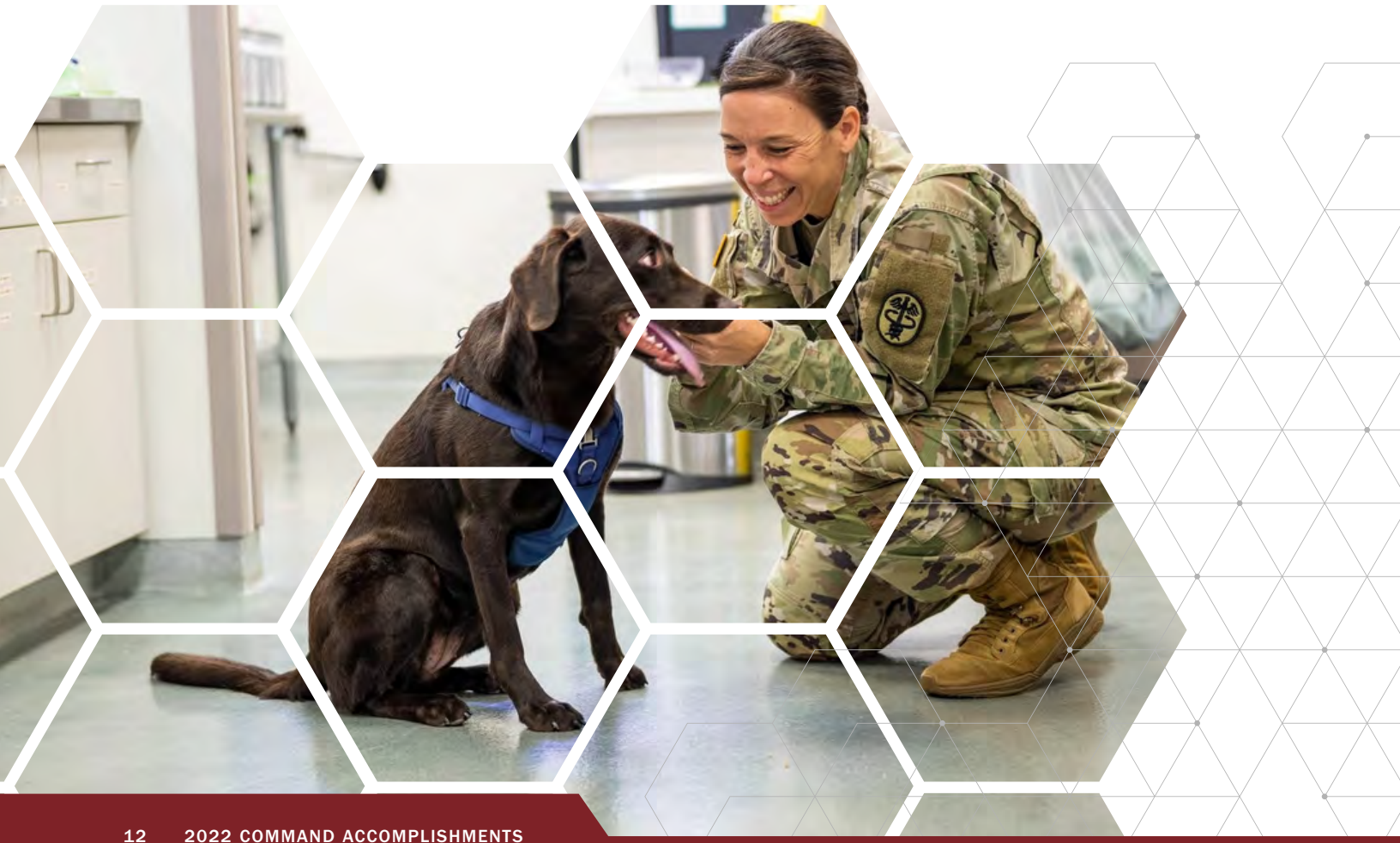
A technology developed and supported by the U.S. Army Medical Research and Development Command's Medical Materiel Development Activity and the Medical Technology Enterprise Consortium is currently being used by surgeons to save lives during the ongoing conflict in Ukraine. The Human Acellular Vessel is a bioengineered blood vessel developed by North Carolina-based biotechnology firm Humacyte. The HAV was created specifically for the repair and reconstruction of various types of vascular injuries. Although the HAV is currently labeled as an investigational product by the FDA, Humacyte worked alongside international partners to send a shipment of HAVs to Ukraine in 2022 for distribution to local hospitals. The HAVs have been used to treat patients, illustrating real-world impact. USAMMDA's Warfighter Expeditionary Medicine and Treatment Project Management Office supported this effort. MTEC is a 501(c)(3) nonprofit corporation consisting of nearly 600 industry and academic organizations and is committed to developing medical tools that better manage, prevent, diagnose, treat and rehabilitate a wide range of injuries. Since its inception in 2016, the organization's consortium-based approach has facilitated an environment for frequent, unabated interaction between military sponsors, academic institutions, non-traditional defense contractors and large businesses to communicate what the military is looking for in any product.

Connecting to the Future: Next-Gen Lab Management System Deployed

In October 2022, the U.S. Army Medical Research and Development Command's Enterprise Information Technology Project Management Office completed initial implementation of an FDA-validated Laboratory Information Management System, representing a major step in the provision of an enterprise-ready information technology system. The implementation is a major milestone, and a step toward a more modernized, integrated IT system that will support USAMRDC's objectives for standardized business practices across labs, data harmonization and improved insight across subordinate commands. The eIT PMO is responsible for providing medical information technology solutions to the command in accordance DOD policies and regulations, along with facilitating coordination, planning, management and execution of the project to ensure successful acquisition and sustainment of IT solutions.

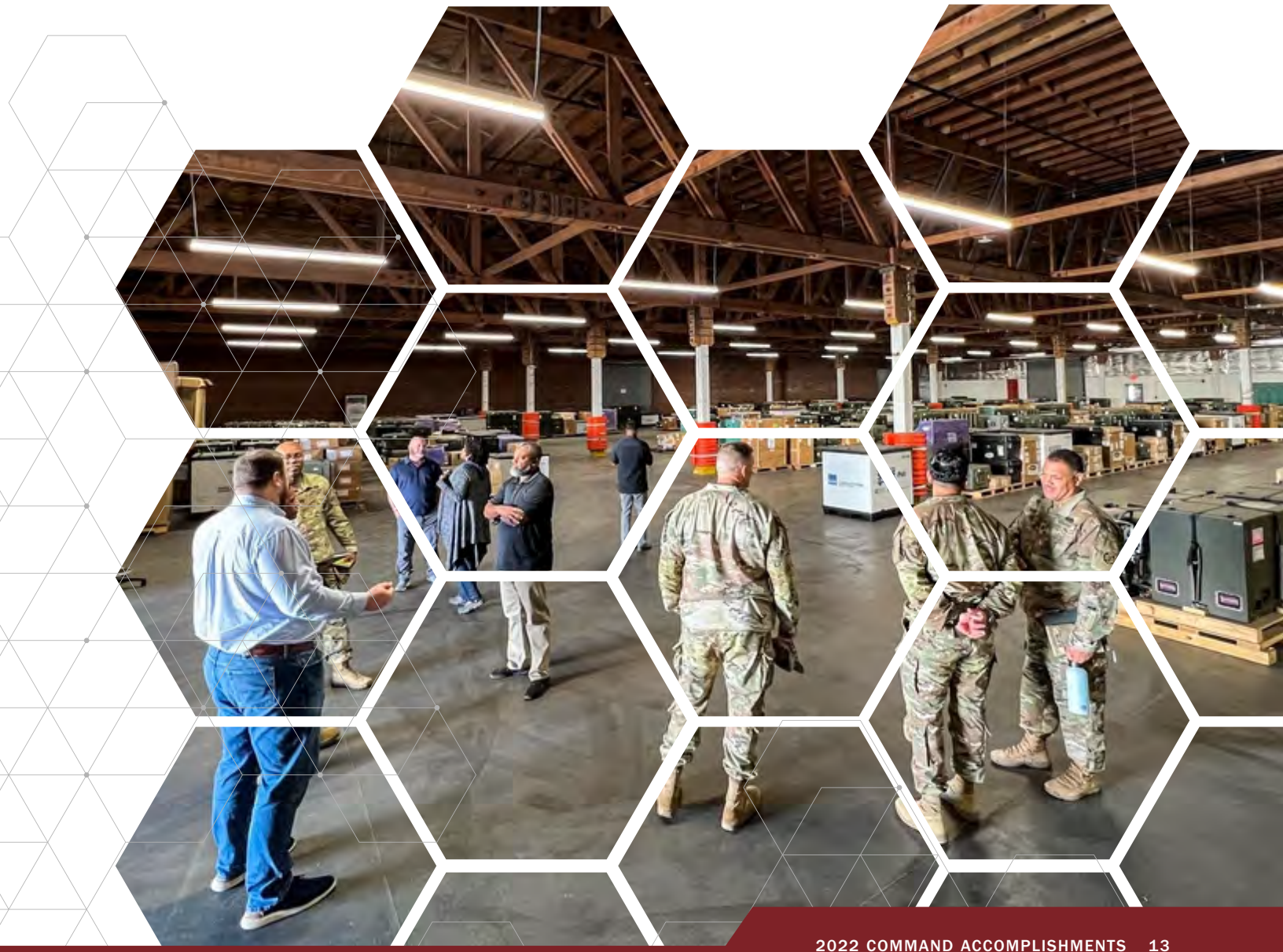
Sniffing Out Success: USAMMDA Modernizes Lifesaving Treatment for K-9 Partners

The U.S. Army Medical Research and Development Command's Medical Materiel Development Activity is working to answer the challenges presented when military working dogs lose blood in combat. The key is lifesaving canine blood products that will sustain MWDs at-or-near the point-of-injury until the animal can be moved to a higher echelon of care. USAMMDA's Warfighter Protection and Acute Care Project Management team marked recent successes in the K-9 blood products program with the disbursement of 10 canine blood plasma training kits from an industry partner. The team fielded five kits to stakeholders within the DOD, the first major milestone from the partnership which began in 2022. USAMMDA is the primary medical product development, systems management and acquisition organization within the DOD and is responsible for meeting medical developmental requirements as well as sustaining deployable medical capabilities for the Warfighter. WPAC PMO leads the development, delivery and fielding of vaccines, prophylaxis and treatments for infectious diseases; therapies and treatments for battlefield wound infections; drugs for battlefield pain management; devices for the diagnosis of infectious diseases and blood products and blood components for far-forward battlefield deployment.



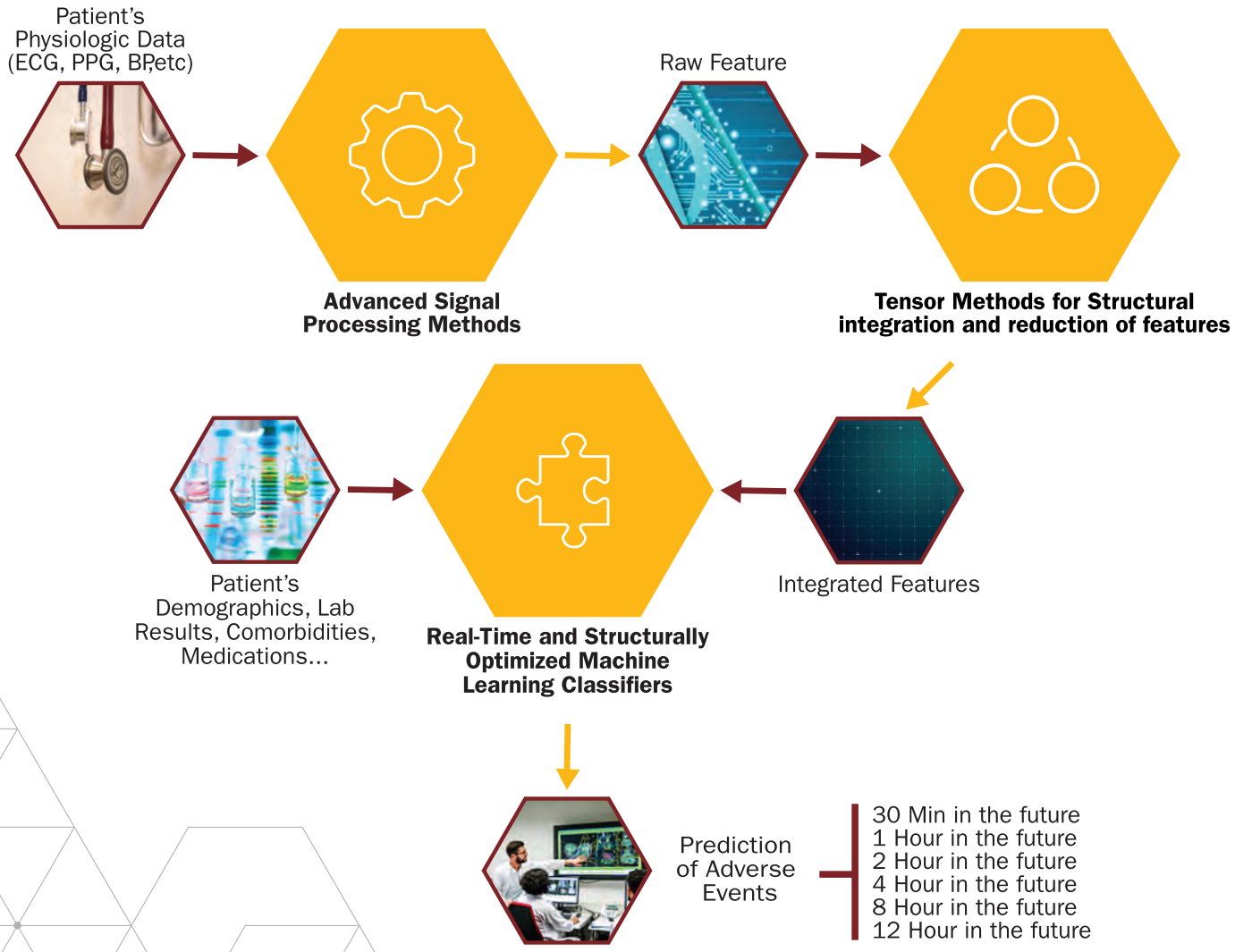
Upgrade Unlocked: USAMMDA Reaches Milestone in Hospital Conversion Project

In the culmination of a near decade-long project, the U.S. Army Medical Research and Development Command's Medical Materiel Development Activity Warfighter Deployed Medical Systems Project Management Office completed the initial phase of an effort to modernize combat support hospitals. More than 11 combat support hospitals have been converted into updated Army Hospital Centers, with the 27th Hospital Center at Fort Stewart, Georgia, becoming the final active-duty unit to receive conversion upgrades. USAMMDA is the primary medical product development, systems management and acquisition organization within the DOD and is responsible for meeting medical developmental requirements, as well as sustaining deployable medical capabilities for the Warfighter. WDMS PMO provides support for medical materiel life cycle management in the Army.



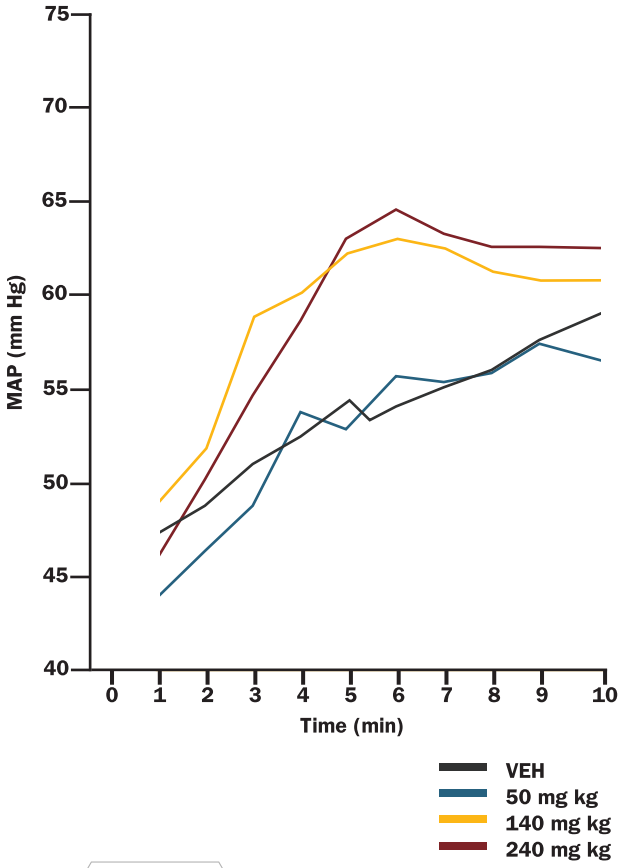
CCCRP Develops System to Catch, Identify Postoperative Threats

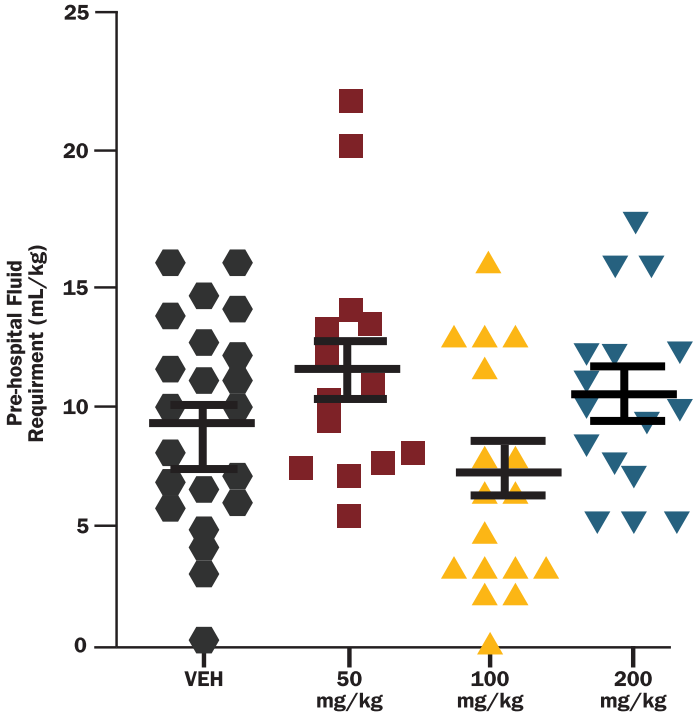
A study funded by the U.S. Army Medical Research and Development Command's Combat Casualty Care Research Program has developed a successful proof-of-concept that electronic health record data and physiologic waveform data can be combined to enable the early detection of postoperative deterioration events. Automated detection may provide opportunities for early and timely interventions that can significantly improve patient outcomes. CCCRP leverages cutting-edge research and knowledge from government and civilian research programs to fill existing and emerging gaps in combat casualty care. CCCRP provides requirements-driven combat casualty care medical solutions and products for injured Soldiers from self-aid through definitive care, across the full spectrum of military operations.



WRAIR Successfully Transitions Key Pre-Hospital Knowledge Product to USAMMDA

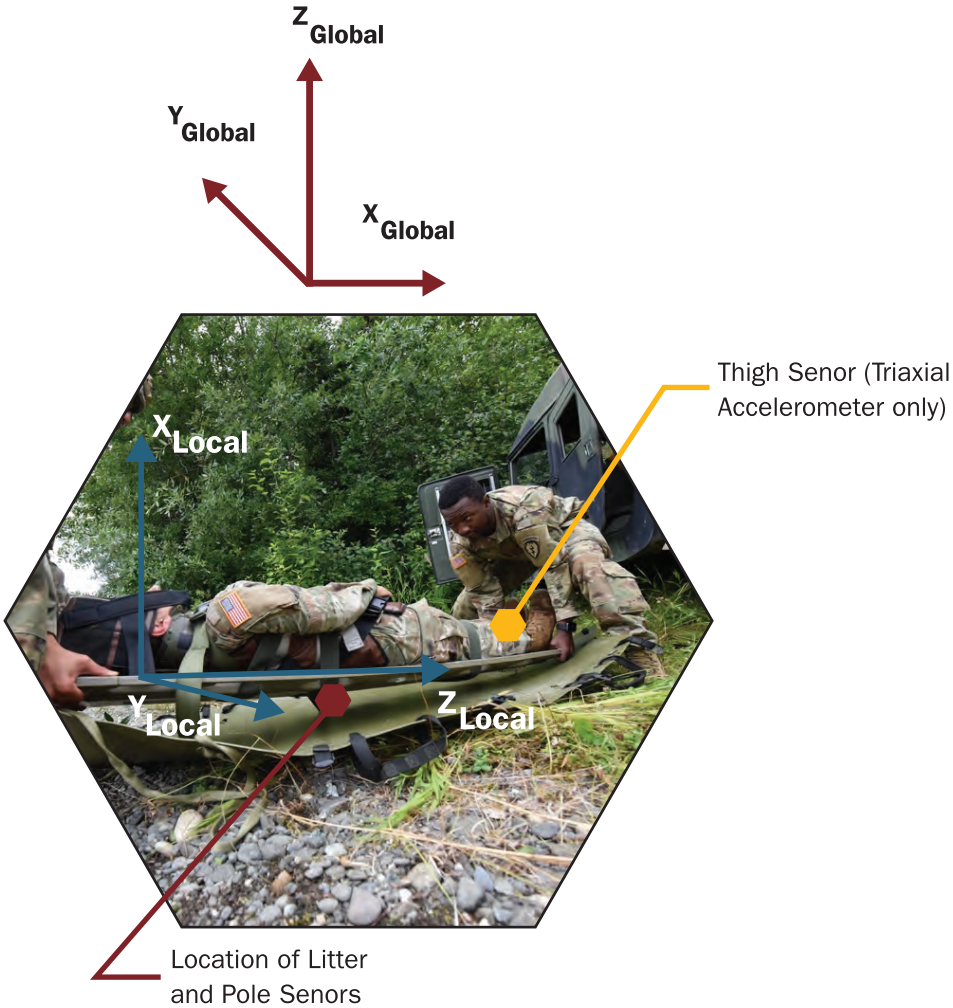
Traumatic brain injuries are a major and enduring concern for the DOD, as such injuries severely impact Warfighter readiness, lethality and return-to-duty efforts. Early administration of tranexamic acid, a promising candidate for prehospital resuscitation that targets trauma-induced coagulopathy, has been advocated for routine use in trauma patients, particularly those requiring massive transfusion. This study suggests dosage is an important consideration in achieving therapeutic effects. This knowledge product transitioned from the U.S. Army Medical Research and Development Command's Walter Reed Army Institute of Research to the command's Medical Materiel Development Activity, where it will undergo further testing and monitoring by the Warfighter Brain Health Project Management Office.





Shock and Awe: USAARL Testing Reveals Negative Impact During Patient Loading, Unloading

The U.S. Army Medical Research and Development Command's Aeromedical Research Laboratory completed research and testing to understand both the unintentional and unexpected mechanical shock and vibration experienced by patients in medical evacuation operations. USAARL's research involves the safety, survival, impact tolerance, sustainability and performance effectiveness of aviators and Soldiers. This project found that the loading and unloading of patients onto aircraft can exacerbate or cause new injuries, especially to the head. Recommendations for improvement include the immobilization of the head during evacuation efforts as well as adding shock-absorbing material to the litter poles on the outboard side of the platform.



Next-Gen Robotic Leg Scores Praise, Major Magazine Cover

Funded in part by a grant from the U.S. Army Medical Research and Development Command's Congressionally Directed Medical Research Programs, the Utah Bionic Leg uses motors and advanced artificial intelligence to give amputees more power and control. The device was featured on the cover of the Science Robotics journal in November 2022. This novel system is optimized to automatically adapt joint behaviors for common activities such as walking, standing up, sitting down and moving up-and-down stairs and ramps. The device continuously assesses the user's movement and updates the trajectory of the robotic leg one thousand times per second to replicate what a biological leg would do in a similar situation. CDMRP originated in 1992 via Congressional appropriation to foster novel approaches to biomedical research in response to the expressed needs of its stakeholders, which include the American public, the U.S military and Congress. CDMRP fills research gaps by funding high-impact, high-risk and high-gain projects that other agencies may not fund. While individual programs are unique in their focus, all programs managed by CDMRP share the common goal of solutions that will lead to cures or improvements in patient care, or breakthrough technologies and resources for clinical benefit.

Synthetic Success: MIDRP Funds Breakthrough in Wound Care

Through the Medical Technology Enterprise Consortium, the U.S. Army Medical Research and Development Command's Military Infectious Diseases Research Program funded the development and testing of Amicidin-α Prolonged Field Care, a synthetic biologic with antimicrobial properties that acts as a physical/electrostatic barrier to pathogens in tissues exposed by trauma. The product, a dry powder, is intended to prevent life-threatening infection of traumatic combat wounds for up to 72 hours. MIDRP leads the DOD's programmatic research investment for naturally occurring infectious diseases with a focus on protecting the Warfighter. This is achieved through the development of vaccines, drugs and diagnostics.

USAMRDC Labs Offer Courses During Critical Joint Training Exercise

In April 2022, instructors from the U.S. Army Medical Research and Development Command's Medical Research Institute of Chemical Defense and the command's Medical Research Institute of Infectious Diseases taught a three-day Medical Management of Chemical and Biological Casualties Course on the USNS Mercy, in preparation for the upcoming Pacific Partnership-22 deployment. Lectures were supplemented with small-group training scenarios, operational demonstrations and a shipboard decontamination and treatment exercise.

As the Nation's center of excellence for medical chemical defense, USAMRICD is the leading science and technology laboratory for medical chemical countermeasures research and development. USAMRICD conducts research and training to enable the Warfighter and to strengthen the defense of our Nation by rendering chemical and biochemical threats medically harmless.

Ebola Breakthrough: USAMRIID Research Reveals Virus Can Thrive – Even After Treatment

The U.S. Army Medical Research and Development Command's Medical Research Institute of Infectious Diseases has demonstrated that Ebola virus can re-emerge from perceived dormancy to cause fatal disease even after treatment has concluded. Researchers discovered that the virus "hides" in the survivor's body, then reactivates and causes disease relapse, potentially causing a new outbreak. USAMRIID found nearly 20 percent of animals that survived lethal Ebola virus exposure after treatment with monoclonal antibodies still had persistent Ebola virus infection. This occurred specifically in the ventricular system even though the virus was cleared from all other organs. The study, featured on the cover of the journal Science Translational Medicine in 2022, reinforces the need for long-term follow-up of Ebola virus disease survivors. USAMRIID was established in 1969 by the Office of the Surgeon General of the Army to develop medical defenses against biological warfare threats. The Institute has played a key role over the past 50 years as the DOD's lead laboratory for medical aspects of biological defense. Research conducted at USAMRIID leads to medical solutions — such as vaccines, drugs, diagnostics and information — that benefit both military personnel and civilians.

Pushing the Limits: USAISR Completes Validation of Key Blood Study

The U.S. Army Medical Research and Development Command's Institute of Surgical Research successfully completed the validation phase of a multi-site chilled platelet study which seeks to evaluate cold-stored platelets for up to 21 days across multiple collection platforms. The study, funded by USAMRDC's Medical Materiel Development Activity Warfighter Protection and Acute Care Project Management Office, compared baseline biochemical and hemostatic function in in-vitro quality metrics of apheresis platelet units collected with currently available platforms used in both civilian and military settings. The results suggest that platelet quality and function differ among collection platforms at baseline. The multi-site teams will next investigate how these differences progress throughout storage and how these in-vitro measures manifest in clinical transfusion. USAISR is a worldwide leader in combat casualty care, biomedical research and novel therapeutics to treat Warfighters from the point-of-injury through the continuum of care.

Telemedicine? At TATRC, *Heli*-medicine Takes Center Stage

In June 2022, researchers from the U.S. Army Medical Research and Development Command's Telemedicine and Advanced Technology Research Center Medical Robotics and Autonomous Systems Division traveled to Alabama to test the remote control and monitoring functionality of the Athena GTX Automated Critical Care System. Alongside the command's Aeromedical Research Lab, TATRC conducted four successful flight tests onboard an H-60 MEDEVAC helicopter to demonstrate basic functionality of the system. The team further explored technical limitations associated with remote control and monitoring of medical devices for airborne evacuation operations. The goal of this project is to develop an airborne test platform to conduct research in autonomous medical resupply and patient transport to inform the design and development of future systems. TATRC's expertise is focused on the entire research spectrum, from early-stage innovative research to technology demonstrations and implementation to benefit the Warfighter.

Peak Knowledge: USARIEM Completes Collection for High-Altitude Research

In August 2022, scientists from the U.S. Army Medical Research and Development Command's Research Institute of Environmental Medicine completed data collection of the AMS_alert algorithm in Taos, New Mexico. The AMS_alert tool is designed to predict Acute Mountain Sickness, High-Altitude Pulmonary Edema or High-Altitude Cerebral Edema prior to occurrence. Roughly 50-90 percent of unacclimatized Warfighters will experience AMS symptoms when rapidly ascending to high altitudes. In real-time, AMS_alert will alert leaders that a Warfighter is in trouble, so they can begin treatment early, adjust the mission and plan evacuations safely. USARIEM conducts biomedical research to improve and sustain Warfighter health and performance under all conditions. The team is engaged in essential medical research focused on optimizing the health and performance of Soldiers during training and on the battlefield.

U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND

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