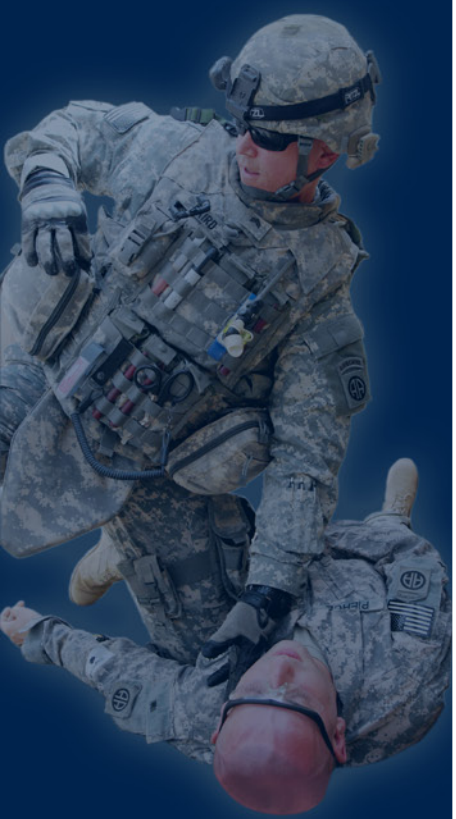
USAMRMC
STRATEGIC COMMUNICATION PLAN

U.S. ARMY MEDICAL RESEARCH AND MATERIEL COMMAND



USAMRMC Public Affairs Office
504 Scott Street
Fort Detrick, MD 21702
301.619.7549
https://mrmc.amedd.army.mil

U.S. Army Aeromedical Research Laboratory (USAARL)

Mission: The U.S. Army Aeromedical Research Laboratory's mission is to preserve and enhance the health, safety, combat effectiveness, and survivability of the U.S. Army Warfighter.

Background

The research conducted at USAARL supports the U.S. Army Medical Department's mission to "conserve the fighting strength." USAARL, located at Fort Rucker, Alabama, is a nationally recognized laboratory for research into Soldier safety, survival, impact tolerance, sustainability, and performance effectiveness for aviators and flight crew. USAARL is one of six research laboratories within USAMRMC. USAARL conducts research in three main areas: (1) return-to-duty research assessing the impact of injuries to neurosensory systems: vision, hearing, balance, and the central nervous system; (2) prevention and reduction of injury to these neurosensory systems; and (3) test and evaluation of medical systems for use during medical evacuation.

USAARL personnel seek to improve force effectiveness by preventing or minimizing health hazards created by military systems, doctrine, and tactics. Specifically, they identify, investigate, and solve medical and health-related problems that deter Soldiers/aviators from performing their missions, or compromise their safety. Additionally, USAARL provides military developers with information and expertise to enhance the performance and safety of future Army systems.

USAARL conducts helmet impact testing, retention testing, and measurement of mass distribution properties of protective helmets—critical topics that affect Soldier protection against occupational and combat injury. For many years, USAARL has evaluated the ophthalmic characteristics of eye protection and provided recommendations to industry and project managers to ensure that the eye protection worn by Soldiers meets military requirements and successfully protects from eye injury threats. USAARL also assesses protective equipment involved in DoD, U.S. Coast Guard, and other federal government rotary-wing accidents to determine if the equipment functioned as designed and intended.

USAARL maintains an extensive database of equipment performance as assessed by equipment retrieved from these accidents (1976 until present). Data are used to justify or recommend advancements in protection requirements for future aviation systems. This proven methodology is also employed in ground accident investigation to improve protection of military vehicle occupants as well as dismounted Soldiers.

The recent surge in under-body vehicle blast injuries has spurred a major USAARL-led research effort to develop a new injury assessment method/manikin that will be able to assess the effectiveness of vehicle blast countermeasures. USAARL is also collaborating in field-based studies investigating the impact of blast exposure on Marine Corps breachers, characterizing the blast environment during their training program.

These controlled-environment data will help in understanding operational blast exposure and its linkage to human deficits and injury.

Exposure to intense noise and blasts in the military environment can also cause damage to the peripheral auditory system and lead to tinnitus, dizziness, and central auditory processing disorders. Soldiers' combat effectiveness and day-to-day functioning may be impaired as a result of these injuries. USAARL research focuses on preventing the auditory effects of intense continuous and impulse noise and on addressing the concerns related to immediate return-to-battle and long-term retain-in-service decisions.

USAARL is a leader in testing and evaluating the efficacy of medical systems used in the U.S. military medical evacuation and ground transport environments, ensuring the safe interaction among the vehicle, medical systems, care providers, and patients. Medical systems that meet military and industry fixed- and rotary-wing aircraft standards are eligible for an airworthiness release and may be safely operated on board all U.S. Army aircraft.

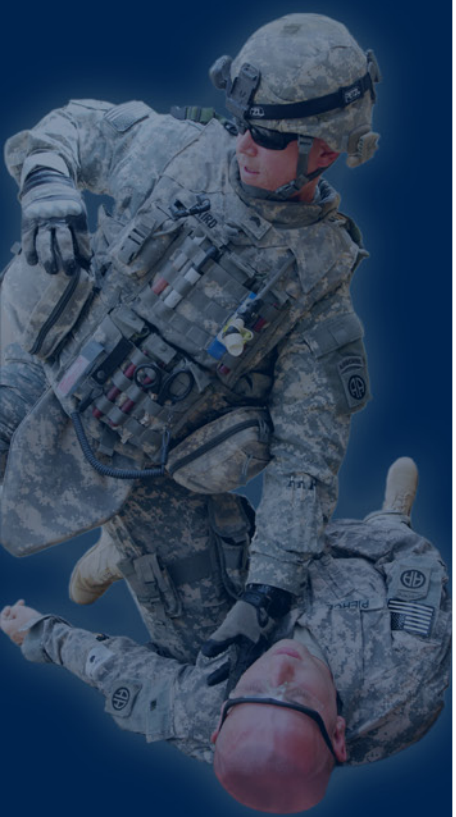
Since 1959, USAARL has served the aviation community by providing world-class aeromedical research aboard the JUH-60A Black Hawk helicopter and inside the NUH-60FS Black Hawk flight simulator. Both devices are capable of collecting pilot flight performance and pilot physiological/psychological data. USAARL has a variety of other facilities, including an eight-bed sleep study laboratory with brain-mapping systems, a visual science laboratory, and anechoic and reverberation chambers.

USAARL's Science Information Center Library specializes in the field of aviation medicine. The library houses a large selection of aviation medicine, scientific, and engineering publications. These include books, periodicals, technical reports, and electronic materials. USAARL also maintains a growing collection of government technical reports including those generated by its scientists.

In addition, USAARL plays an active role in science, technology, engineering, and mathematics (STEM) education. Each summer, USAARL leads the Gains in the Education of Mathematics and Science (GEMS) program at Fort Rucker. The GEMS program is a U.S. Army Educational Outreach Program that emphasizes educating students in the areas of STEM and is structured to increase students' interest in these areas by engaging them in experiments. College-age mentors teach the fifth through eighth grade GEMS participants by using fun, hands-on experiments. USAARL researchers also speak and lead experiments at the local junior high school Science Club meetings, and they open their laboratories to tour groups from area schools.

Key Themes & Messages

- USAARL research programs aim to prevent or mitigate injury and health hazards in the military operations environment and sustain aviator/Warfighter performance.
- USAARL conducts research in the areas of return-to-duty, acoustics, vision, crew workload, stress and fatigue, life support systems, and injury biomechanics.
- USAARL tests and evaluates the efficacy of medical systems used in U.S. military medical evacuation and ground transport environments.



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Q & A

Q: How does USAARL impact Soldiers' return-to-duty?

A: USAARL's return-to-duty research program focuses on assessing the impact of injuries to neurosensory systems: vision, hearing, balance, and the central nervous system. The goal of this research program is to establish valid, evidence-based, operationally specific return-to-duty criteria to determine the level of operational competence and performance of a Soldier after cognitive and neurosensory injury, including those resulting from blast, blunt, and ballistic threats. Our research in this area will result in better-informed decisions concerning the retention and possible reclassification of wounded warriors and a more capable fighting force.

Q: Who are USAARL's research collaborators?

A: USAARL collaborates with universities and industry, Veterans Affairs and military hospitals, and military laboratories.

Q: Do military personnel or civilians participate as subjects in the research?

A: Most often military personnel participate as subjects in USAARL research. Civilians may meet the inclusion criteria for some of the studies.

Q: Who funds the research program?

A: USAARL receives core funding from the USAMRMC, Military Operational Medicine Research Program. Researchers also compete for and, if selected, are awarded funding through the Defense Health Program. Other sources of funding include research partnerships with academic institutions and agreements with industry.

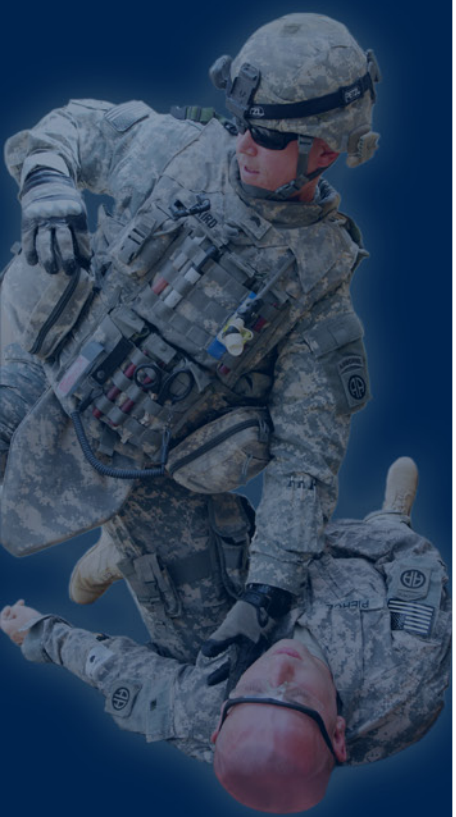
Q: What educational employment opportunities are available at USAARL?

A: USAARL has an active Oak Ridge Institute for Science and Education program, a Student Career Experience program, and a Student Temporary Employment program. These programs offer college students and recent graduates hands-on experience in their field of study.

Q: What are some of USAARL's unique research capabilities?

A: USAARL maintains the following research capabilities:

- NUH-60FS Black Hawk Flight Simulator: Reproduces environmental conditions of flight within the NUH-60 and records pilot flight performance.
- JUH-60 Black Hawk Instrumented Helicopter: Instrumented with in-flight measurement systems to monitor and record aviator physical status, flight performance, and aircraft performance in real time.
- Man-Rated Multi-Axis Ride Simulator (MARS): Simulates the ride of any tracked/wheeled vehicle or aircraft. The MARS is linked with multichannel physiological monitoring, biomechanical measurement, and human performance assessment systems.
- Acoustical Sciences Research Facility: Includes anechoic/reverberation chambers, an audiometric research facility, a real-ear attenuation measurement room, a mobile field laboratory, and a rotary chair for diagnosing bilateral vestibular hypofunction and conducting eye movement recordings.
- Visual Sciences Research Facility: Includes a laser ophthalmoscope, corneal topography, an optical distortion measurement system, a visual display laboratory, a visual psychophysics facilities, an optical fabrication laboratory,



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a mobile field laboratory, an Olympic quality, multilane precision air rifle range, and a hypoxia laboratory.

- Helmet Impact and Retention Testing Facility: Includes a monorail impact tower, a free-fall impact tower, a mass properties instrument, a Tinius Olsen quasi-static test machine, an Instron quasi-static materials tester, a high-speed camera system, and a dynamic mini-sled system.
- Aeromedical Equipment Test Facility: Consists of an electromagnetic interference chamber, an altitude chamber, four environmental chambers, and a vibration table.
- Human Psychophysiology Laboratory, Polysomnography Laboratory and Bright Lights Testing Facility: A fully instrumented laboratory with specially constructed test chambers, topographic brain-mapping systems, an array of physiological monitoring equipment, the capability to measure sleep disruptions stemming from operationally relevant stressors, sound-attenuated and electrically shielded bedrooms; multi-room video monitoring, polygraphs, computerized sleep scoring systems, and a three-room bright lights laboratory.

Q: What are some of USAARL's recent accomplishments?

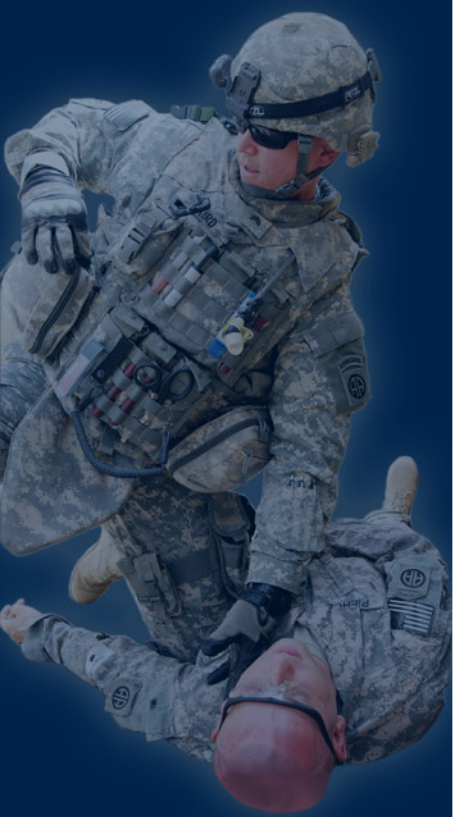
A: Accomplishments for the previous year include:

- Findings from a USAARL study on dextroamphetamine (Dexedrine®) and modafinil (Provigil®) enabled the approval of the use of modafinil by U.S. Army aviation forces.
- Injury analyses on Stryker and mine-resistant ambush-protected accidents led to improvements to combat vehicle Soldier restraint.
- USAARL tested and evaluated the performance of 20 medical systems for use during en route care, ensuring the safe interaction among the vehicle, medical systems, patients, and care providers. Six additional medical systems were tested for hospital use.
- USAARL and Virginia Tech University collaborated to develop algorithms for Facial and Ocular Countermeasure for Safety Headform (FOCUS)—a face/eye injury assessment manikin—allowing researchers to assess the effectiveness of face/eye wear to protect against serious face/eye injury.
- USAARL collaborated with fellow acoustics experts to publish an American National Standards Institute/Acoustical Society of America standard, which defines methods to measure the hearing protection of devices designed to protect against impulse noise.

Q: What USAARL products have transitioned to the civilian sector?

A: Several products developed by USAARL have transitioned to the civilian sector. These products include:

- Communications Earplug (CEP): A lightweight communications system that provides the U.S. Army aviator with state-of-the-art hearing protection and crystal-clear communications.
- FOCUS: A research headform that is used to test and evaluate the performance of face and eye protective equipment by predicting the degree of eye injury and facial fracture sustained in blunt impact and blast environments.
- Helmet-Mounted Displays (HMDs) Books: Two comprehensive texts on HMDs—the first book summarizes engineering issues pertaining to HMDs, whereas the second book discusses the effects of HMDs on users' sensation, perception, and cognition of visual and auditory displays.



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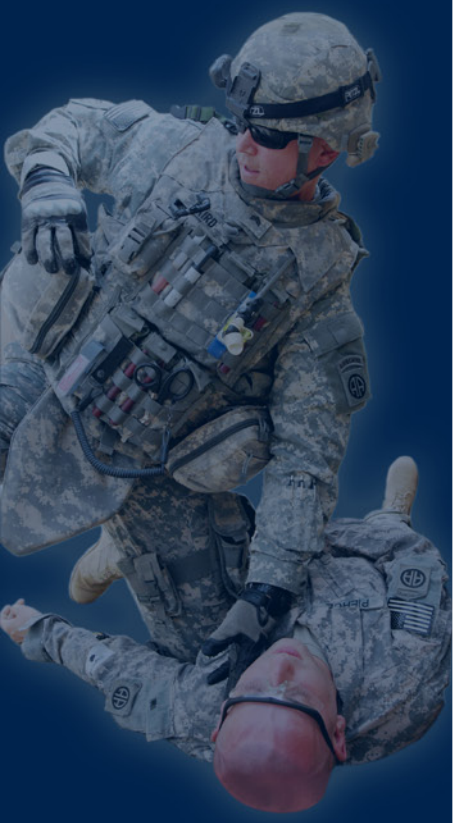
- Whole-Body Vibration/Jolt Standard: ISO Standard 2631-5:2004 is used to predict injuries sustained by Soldiers who ride in Army tactical vehicles at high speeds over rough terrain.
- USAARL Small Letter Contrast Test: A measure of "functional vision" that can be used to help select individuals for professions with unique visual requirements, such as required by fixed- and rotary-wing pilots.
- Rabin Color Vision Test: A computer-based test used to quantify normal color vision performance and identify type and severity of abnormal color vision.

Q: How does the civilian sector benefit from research conducted by USAARL?

A: The results of USAARL research in several areas apply to the civilian sector.

- Results from research using the FOCUS can be used to develop biomedically validated standards for facial, eye, head, and neck protection and to design safer protective equipment, like sports eyewear.
- Testing and evaluation of the blunt impact protection of sports helmets are conducted by USAARL. Results contribute to the development of safer helmet designs by the sporting industry.
- Testing and evaluation of medical systems intended for use on-board medical evacuation aircraft are conducted by USAARL. Medical systems that meet military and industry standards are eligible for an airworthiness release, meaning the systems can be safely operated on-board U.S. Army fixed- and rotary-wing aircraft. These medical systems are developed by civilian companies.
- USAARL is currently evaluating a noise immune stethoscope with patients with cardiopulmonary pathology in real-world operational environments. Once the device transitions to the civilian sector, it will provide medical care providers with the ability to detect heart sounds in noisy environments where traditional stethoscopes are not effective.
- USAARL researchers are developing a tool that quantifies balance performance and provides sway feedback to improve balance. This device will be an effective tool for the rehabilitation of individuals with balance deficits due to injury (e.g., stroke and brain injury).



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