



Military Operational Medicine Research Program

Mission

The mission of the Military Operational Medicine Research Program (MOMRP) is to develop effective countermeasures against stressors and to maximize health, performance, and fitness. Our mission is protecting the whole Soldier from head to toe, inside and out, at home, and on the battlefield. Science to Soldier is indeed our focus.

Background and Environment

MOMRP, U.S. Army Medical Research and Materiel Command (USAMRMC), conducts biomedical research to deliver products and solutions to the Warrior that address health and fitness throughout the deployment cycle. MOMRP is centered on cutting-edge scientific research and bringing science to the Soldier on the battlefield in a relevant, timely manner. MOMRP depends on a phenomenal cadre of dedicated scientists and engineers who continuously and tirelessly work to protect the nation's most valuable asset—the Warrior. MOMRP is divided into four research focus areas: Injury Prevention and Reduction, Psychological Health and Resilience, Physiological Health, and Environmental Health and Protection.

Key Themes and Messages

Injury Prevention and Reduction

Biomedical basis for countermeasures that prevent and mitigate Warrior injury

Warriors are susceptible to physical, sometimes debilitating injuries. Head and neck injuries, including severe brain trauma, have been reported in one-quarter of evacuated service members. In the past 5 years, the Walter Reed Army Medical Center alone has surgically treated approximately 700 Warriors with moderate to severe visual injuries. Nearly 70,000 combat troops are collecting disability for tinnitus and more than 58,000 for hearing loss. Medical disability discharge rates have increased with 78 percent due to musculoskeletal injury. MOMRP research helps prevent physical injuries through development of injury prediction models, equipment design specifications and guidelines, health hazard assessment criteria, and strategies to reduce musculoskeletal injuries.

MOMRP Injury Prevention and Reduction research develops models to predict the degree of injury from known threats, develops design guidelines and performance specifications for protective equipment, and identifies countermeasures to prevent or mitigate injury to the Warrior. Key threats addressed by this research area include blast overpressure, blunt and penetrating trauma, musculoskeletal and training injuries, and neurosensory injury. This program addresses thoracic and pulmonary injury protection through modeling blast and blunt trauma, protection that prevents or reduces neurosensory injury, validated standards for performance to assess return to duty, and training doctrine based on physiological mechanisms that underlie musculoskeletal injury that identify and mitigate injury risks.



Psychological Health and Resilience

Strategies and interventions that build psychological resilience and optimize psychological health and emotional fitness among Soldiers and families

Psychological health problems are the second leading cause of evacuation during prolonged and/or repeated deployments. Of returning Warriors, 20–40 percent have behavioral health problems post-deployment, mostly related to post-traumatic stress disorder (PTSD), depression, and interpersonal conflict. MOMRP researchers develop strategies and advise policy makers to enhance and sustain mental fitness throughout service members' careers. These include validated prevention and treatment interventions that address psychological health issues, enhanced screening and identification of concussion-related health concerns, and improved clinical guidelines for health care providers.

MOMRP Psychological Health and Resilience research is focused on prevention, treatment, and recovery of Soldiers' and families' behavioral health, which are critical to force health and readiness. Research is necessary to guide policy and ensure optimal delivery of behavioral health training and services across the continuum of care and deployment cycle. Threats addressed by this research component include PTSD, suicide, family separation, and family violence.

Physiological Health

Biomedical countermeasures to sustain Warrior health and operational effectiveness

The rapid pace of operations and the need for repeated deployments have a profound effect on the physiological health and performance of Warriors. MOMRP develops novel nutritional strategies that maintain and sustain optimal health and readiness, a comprehensive sleep and performance management system that predicts Warrior physiological degradation, and a real-time medical status monitoring and situational awareness informational system enabling commanders to ensure mission success.

MOMRP Physiological Health research focuses on developing medical standards, predictive models, and countermeasures to prevent or mitigate the effects of physiological stressors on the performance and fitness of Warriors. These stressors include inappropriate nutrition, poor physical fitness, sleep loss, sleep deprivation, fatigue, and burn out. The focus is on threats and stressors in both the garrison and operational environments. Current research addresses advanced biomedical modeling and networked physiological status monitoring capabilities, a comprehensive sleep and performance management system based on effects of chronic sleep restriction and acute total sleep deprivation, individual physiological differences in sleep loss resilience, nutritional health surveillance and dietary supplement use, and interventions to mitigate threats to operational health.

Environmental Health and Protection

Assess and sustain Warrior health and performance in extreme environments

Warriors train and fight while exposed to a range of harsh environmental conditions, such as extreme heat and cold temperatures and high terrestrial altitude. These harsh environmental conditions, alone or combined with other operational stressors, degrade military physical and cognitive performance.



MOMRP provides guidelines to mitigate performance degradation from these environmental extremes. Warriors are also susceptible to exposure to toxic chemicals and materials in the operational environment. MOMRP develops biomarkers to detect toxic exposures and methods to assess their impact on health risk.

MOMRP Environmental Health and Protection research develops medical standards, predictive models, and countermeasures to prevent or mitigate the effects of extreme environments and toxic material exposure in the military. Threats addressed by this program include extremes of heat/cold and hydration, high altitude, and toxic industrial chemicals and materials. Current research projects focus on methods that sustain operational performance in extreme heat and cold and at high altitudes to prevent and manage heat, cold, altitude sickness, and hydration-related injuries. This research also includes detecting, monitoring, and assessing the risk of the Warrior's exposure to toxic chemicals and materials during operations.

MOMRP conducts medical research to deliver products and solutions for the Warrior that address health and fitness throughout the deployment cycle. The focus is on life cycle solutions that maximize the effectiveness of taxpayer dollars and minimize the health effects of operational and environmental stressors on the Warrior. MOMRP leverages its Department of the Army funds and congressionally directed funds for research not only at Department of Defense (DoD) laboratories but also at myriad extramural research organizations from small colleges to multinational corporations in the development of cutting-edge technology. The research products are directly applicable to today's battlefield and the anticipated problems of tomorrow's war.

Questions and Answers

Q1. What are some developments in Injury Prevention?

A1. Developments from the Injury Prevention Program area include:

- Devices to collect data and assess blast overpressure hazards to prevent occupational injuries for military personnel during weapon firing exercises.
- Software tools to assess injury data and ultimately help developers design protections to mitigate blast overpressure injuries for Warfighters.
- Toxic Gas Assessment Software – Performance Evaluation predicts probability of total incapacitation, immediate lethality, and delayed lethality from inhaling a mixture of seven common fire gases (i.e., low O₂, CO, CO₂, NO₂, HCN, HC₁, and Acrolein).
- Standards to protect eyes and prevent injury.
- Injury prevention and restraint technologies for ground vehicles and helicopters (inflatable restraint systems).
- Databases to track and store demographic, occupational, and health information of Army members over the course of their active duty careers.

Q2. What are some developments in Psychological Health and Resilience?

A2. Developments from the Psychological Health Program area include:



- Pre/Post-Deployment Psychological Screening
- The Army Medical Department Suicide Event Report captures information on suicide and includes quantitative and qualitative information to better understand and summarize suicides in real time.
- Doctrine and Training: Research findings and recommendations that led to the revision of combat and operational stress control doctrine and medic training courses
- Resilience Training

Q3. What are some developments in Physiological Health?

A3. Developments from the Physiological Health Program area include:

- Enhanced fluid and nutrition delivery system to reduce hydration-related heat injury and sustain performance.
- Studies of alertness-promoting agents for aviators performing extended operations.
- The First Strike Ration is a lighter weight, shelf-stable, appealing, and nutritious individual ration that increases mental awareness and stamina for use during high-tempo operations in logistically austere conditions.
- Nutrient delivery system, as an add-on to the personal hydration system, enables a user to receive nutrition on the move.

Q4. What are some developments in Environmental Health and Protection?

A4. Developments from the Environmental Health and Protection Program area include:

- Cold Exposure
 - Probability of Survival Decision Aid predicts hypothermia, dehydration, and survival time during prolonged exposure to a wide range of air and water conditions at sea.
 - To alleviate the psychomotor and cognitive deficits associated with cold exposure, nutritional supplements were evaluated for their efficacy in prevention during hypothermia.
 - Environmental Strain Prediction Models are biomedically valid tools for predicting individual and unit-level performance outcomes based on environmental and operational variables.
- High Altitude
 - High-altitude (terrestrial) exposure guidelines were developed to prevent and reduce hypobaric hypoxia-related illnesses and performance impairments to service members.
 - Nutritional supplements were evaluated for their efficacy in improving exercise performance at high altitude, and the effect of dehydration on performance at high altitude was quantified.
- Heat Exposure
 - Heat exposure guidelines were developed to prevent and reduce heat-related injuries to service members.
 - Nutritional supplements were evaluated for their efficacy in improving exercise performance in the heat, and the effect of dehydration on performance in the heat was quantified.
- Toxin Exposure



- Intelligent Aquatic Biomonitor System monitors fish behavior as a way to detect toxic chemicals in water. The iABS rapidly detects a wide range of toxic chemicals or chemical mixtures in water sources by measuring changes in fish behavior. Fish are natural integrators of water quality conditions and respond to a wide range of chemicals and mixtures.
- Rapid Analysis of Water for Select Chemical Contamination is a solid-phase microextraction and gas chromatography-mass spectrometry sampling and analysis method developed for two insecticides, carbaryl and lindane.

Q5. What is meant by mission reset and recovery?

A5. Sustained combat operations such as those in Iraq and Afghanistan cause physical and mental fatigue due to the physically demanding work as well as lack of sleep. Mission reset and recovery are terms that are used to describe the need for adequate rest, nutrition, and fitness to ensure that Warriors are functioning at their highest possible level of physical readiness and mental alertness.

Q8. Where can I find more information about MOMRP?

A8. Visit <https://momrp.amedd.army.mil> to learn more about MOMRP.