Military Operational Medicine Research Program Overview

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Preservation of deployed operational capabilities by minimizing consequences of wounds/illness for service members across all mission environments.
Overview of MOMRP

MOMRP is an extremely diverse program

» Supports operational health, readiness and performance of the Joint Warfighter across the Range of Military Operations and Service member life-cycle

» Manages R&D to understand novel mechanisms and develop focused solutions at the group and individual level for Precision Operational Medicine

» ~90% of MOMRP projects are linked to knowledge products that are central to Human Performance Optimization Enhancement, Human Dimension, Multi-Domain Operations, Army Modernization Priorities, and the DoD Total Force Fitness (TFF) concepts
Develop effective biomedical countermeasures against operational stressors and to prevent physical and psychological injuries during training and operations in order to maximize the health, readiness and performance of Service members and their Families.

### Science

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Developing and Maintaining a Healthy, Ready and High Performing Force

MOMRP Solutions Across the Army Lifecycle: Human Dimension / Human Performance Optimization

- Physical fitness standards
- Women in combat/gender-specific vulnerabilities
- Epidemiological studies to evaluate health risks pertaining to military deployments
- Performance optimization in the context of MOS
- Physical & cognitive load
- Human Systems Integration
- Training technology
- Leadership training
- Measures of unit cohesion
- Behavioral screens
- Cultural awareness training & education
- Resilience training
- Accession standards & strategies to predict retention
- Assessment of potential
- Accession standards & strategies to predict retention
- Assessment of potential
- Monitoring and evaluation of health risks
- Wearables for Health, Readiness and Performance

K-12 thru Accession
NIH/ARI/AMSARA

Basic Training/Advanced Individual Training
TRADOC/MRMC/ARI

Reconititution
MRMC/ARI

Reset
MRMC

Post-Deployment
OTSG/HA/MRMC/PHC

Treat Casualties
MRMC

Re-Deployment
OTSG/HA/MRMC/PHC

Deployment/Employment
MRMC/NSRDEC/ARL

Mobilization/Pre-Deployment
MRMC/ARI

Post-Military Surveillance
VA/MRMC

Separation
MRMC/VA

Readiness
MRMC/ARI

Wearables for Health, Readiness and Performance

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UNCLASSIFIED
**Vision:** Produce a healthy, ready and high performing Joint Force capable of enduring and recovering from the rigors of training and operational environments. Ensure the psychological health and well-being of Service member Families.

**Goals:**
- Protect, sustain and optimize the health, readiness and performance of Service members
- Develop healthy and resilient Service members and their Families
- Ensure capabilities are tied to Joint Requirements in support of HA, DHA, and Service priorities
- Ensure an integrated, productive set of research programs that meet Service member needs

**FY19**
- Operationally Relevant Fatigue Assessments
- Cold Weather Decision Aid
- Head Supported Mass Criteria
- Iron Sustainment in Female Service Members

**3-4 Years**
- Noise Dosimetry
- Interventions to Minimize Musculoskeletal Injuries
- Brief Cognitive Behavior Therapy to Reduce Suicide

**4-5 Years**
- Integration of Wearables with Improved Warfighter Readiness Score
- Operationally Relevant Fatigue Assessments
- Novel Strategies to Promote Psychological Health and Resilience

**Beyond POM**
- Identify Molecular Indicators of Adverse Health Effects from Exposure to Environmental Hazards
- Mitigate Cumulative Effects of Low-level Blast Exposures through PPE and focused surveillance
- Validation of Non-invasive Sleep Augmentation Technologies to Sustain Operational Performance
- Identify Medications and Emerging Interventions to Treat PTSD Symptoms
- Develop Wearable Technology that Can Reduce Risk of Overuse Injury and Enhance Physical Performance in MOSs
Collaboration and Research Transition is Critical!

Materiel Products

• Examples: Diagnostic devices, decision aids (mobile apps), pharmaceuticals
• Established transition pathways
• USAMRMC Advanced Development required

Knowledge Products

• Examples: Technical bulletins, clinical practice guidelines, training guidelines, educational tools, algorithms or models
• Transition pathway may not be that clear but the PI should ensure science is strong enough to recommend for implementation
• May require Verification, Validation & Accreditation (VV&A) process
• Publications are necessary but hand offs to DoD organizations has greater value
• Collaboration with DoD labs and end-users is key
NOTE: MOMRP provides funding and oversight to multiple Extramural (e.g., Academia, Industry) performers, as well as other non-medical DoD laboratories.
Heat Exposure
- Performance and injury predictions
- Return to duty criteria following heat injury
- Microclimate cooling
- Technologies for optimal hydration/rehydration management

Altitude/Hypoxia Environments
- Performance and injury predictions
- Technologies to support sustained operations

Multi-environmental Stressors
Arctic Operations
Toxicant Exposure

- Accurate dose information for exposure to industrial chemical mixtures and material hazards
- Technologies and wearable devices to track chemical/toxic hazard exposures

Biomarker Panels to Assess SM Impact

- Toxicant environmental health hazards
- Industrial chemical mixtures found in dense urban environments

Acute and Chronic Health Effects Linked to Response-Biomarkers
• **Altitude Readiness Management System (ARMS):** Integrated handheld software decision aid to plan, monitor and manage unit altitude exposure of unacclimatized Soldiers, predicts altitude illness risk and task performance. Mobile application delivered to Nett Warrior in FY16.

• **Soldier Water Estimation Tool (SWET):** Integrated handheld software decision aid to provide potable water intake requirements for mission planning in hot environments, wearing military ensembles, and different levels of task work. Mobile application delivered to Nett Warrior in FY16.

• **Environmental Sentinel Biomonitor (ESB):** System with two portable sensors to test drinking water in deployed situations and rapidly identify toxicity from wide range of chemicals. Milestone C achieved in FY16.

• **Real-Time Physiological Status Monitoring (RT-PSM):** Wearable system of physiological and performance sensors to assess Soldier thermal strain, energy expenditure, cognitive and physical performance; provides actionable information to prevent injuries and predict readiness. Partnered with PM Medical Support Systems (USAMMDA).

• **Integration of DoD Wearables** – ASD(R&E) asked MOMRP to be DoD lead. Partnering with MIT-LL to ensure an integrated program.
4. MISSION STATEMENT. The CCLTF will develop, evaluate, recommend, and monitor the implementation of improvements to U.S. squad level infantry combat formations in order to ensure overmatch against pacing threats and strengthen the combat lethality, resiliency, and readiness of infantry squads.

Close combat focus areas include:

- Manpower policies
- Training
- Lethality
- Mobility & Soldier’s Load
- Human Performance (physical & cognitive)
- Sensing
- Survivability
- Sustainment
- Resiliency
- Communications
Human Performance Optimization & Enhancement (HPOE)

- *Proactive*
  - Chronic Disease Prevention
  - Immune System Enhancement

- **Active**
  - Event Fueling
  - Post-Event Recovery
  - Task-Specific Body Composition
  - Mental Function Enhancement
  - Arduous Environment Preparedness

- **Proactive**
  - Health Promotion and Chronic Condition/Disease Prevention

- **Reactive**
  - Medical Treatment and Therapy

- ***Reactive***
  - Illness and Injury Recovery

References:
Training and Operational Environments

- Improved understanding of the physiological mechanisms underlying musculoskeletal injuries
  - Advanced technologies for real-time assessments outside of the clinic

- Physical fitness training strategies to reduce the risk of injury from load, jolt, vibration, etc.

- Countermeasures to mitigate injury risk potential for exploitation in training environments
Training and Operational Environments

- Development of injury criteria for Personal Protection Equipment against blunt, blast and ballistic trauma threats

- Injury criteria and medical performance standards to protect against hearing loss, vestibular injury, and ocular facial injury

- Standards and criteria to identify when Warfighters are capable to Return-to-Duty (RTD), fully able to perform demanding tasks
• **Occupational Physical Assessment Tool (OPAT):** TRADOC/USARIEM initiative to determine performance requirements for physically-demanding MOSs and develop gender-neutral standards & assessments to match Soldiers to right MOS, increase MOS success and prevent injuries. Implemented Army-wide in JAN 17.

• **Environmental Sensors in Training (ESiT):** Technical requirements and methodologies for blast and head impact sensors in the field; brain health risk prediction models for cumulative blast and head impact exposures to optimize human performance in training and increase medical readiness.

• **Eye Protection:** Optometric standards and guidelines for protective eyewear that will increase aircrew acceptance, protection, and compatibility with flight systems.

• **Hearing Protection Standards:** Validated impulse noise limits standards and hearing protection testing methodology guidelines for hearing hazard assessments.

• **Pharmaceutical Intervention for Noise-induced Hearing Loss:** Successful S&T program (Materiel Development Decision JUL 16) for prophylactic administration to prevent/mitigate noise-induced hearing injury and, in turn, prevent permanent and irreversible hearing loss.
Fatigue Mechanisms and Countermeasures

- Novel mechanisms in understanding/manipulating sleep for performance and health

- Sleep quality assessment that is objective but not necessarily tied to actigraphy/polysomnography – *What are we currently measuring and what are we currently missing?*

- Non-pharmacological manipulation of alertness and sleep

- Use of VALIDATED wearables for Sleep as an indicator/predictor of performance, safety and health

- Management of Circadian rhythms
Nutrition Solutions, Countermeasures and Strategies

- Nutrition solutions to optimize recovery and sustain the Joint Warfighter under extreme conditions

- Nutritional interventions for mission reset and injury recovery -- countermeasures for physical and cognitive degradation following military operations

- Protection strategies to mitigate operational stress

- Tailored, modular ration components to improve readiness
Physiological Basis of Resilience and Cognitive Readiness

- **Sustain robust cognitive function** in Service members under acute operational psychological/physiological stressors

- **Promote adaptability to novel, militarily-relevant demands** and improve cognitive function in Service members over the course of a training cycle or career
• **Fatigue and Sleep Management**: User-friendly platform-specific tool to predict alertness based on sleep/wake history, circadian factors, and countermeasures. Materiel and knowledge products from MOMRP sleep program inform sleep guidance for the Army Office of the Surgeon General (OTSG).

• **Healthy Eating and Lifestyle Training Headquarters (H.E.A.L.T.H.)**: Congressionally-supported effort to aid Soldiers/Families to maintain weight, fitness, combat readiness, and performance using portable, interactive technology; transitioning to Performance Triad platform for implementation.

• **Recovery Nutrition**: Specifications for rations/menus/dining facility feeding plans to promote rapid recovery after missions by replenishing nutrients/energy, promoting muscle/bone/brain healing, optimizing cellular resistance to trauma/stress, and accelerating recovery from physical injury or illness.

• **Physiological Basis of Resilience**: Studies in high intensity, high stress training scenarios to begin to document biomarkers that are predictive of performance under stressful conditions.

• **Load Carriage Decision Aid (LCDA)**: Comprehensive tool that predicts Soldier metabolic cost as a function of individual and clothing characteristics, load carried, terrain, weather, and nutritional intake. Tool provides Soldiers and their leaders with guidance to prevent physical injuries associated with over-burden that can improve mission success. Currently in Advanced Development.
Service Member Resilience

- Evidence-based individual and group interventions and technologies to promote Resilience

- Resilience training that incorporates key behavioral health outcomes

- Biomarkers of resilience

Behavioral Health

- Tools and technologies to better prevent, diagnose, and treat mental health issues such as suicide and substance abuse
Psychological and Behavioral Health

- Non-self report assessment technologies of psychological well-being and status

- Telemedicine and mental/behavioral health approaches that overcome barriers/challenges

- Identification/validation of biomarkers for Post Traumatic Stress Disorder (PTSD)

- Translational efforts on the diagnosis and treatment of PTSD
• **Deployment Cycle Resilience Training (DCRT):** Skills-based training to enhance Service member and Family resilience to occupational stressors and mitigate negative behavioral health problems. The Walter Reed Army Institute of Research (WRAIR) Research Transition Office works with the Army Resiliency Directorate (ARD) to transition products to the field on an ongoing basis.

• **Brief Cognitive Behavior Therapy for Suicide (BCBT):** Randomized controlled trial (RCT) demonstrated a competency-based 12-session outpatient psychotherapy reduced suicide attempts by 60% among high-risk active duty Soldiers compared to treatment as usual. A training curriculum was developed and a treatment manual will be published (2017). Replication trial is planned for 2018.

• **Crisis Response Planning (CRP):** CRP increasingly used as a stand-alone intervention for reducing suicide risk. Two RCTs demonstrated that CRP led to a 75% reduction in suicide attempts compared to treatment as usual (2017). A manual and training curriculum are available through the National Center for Veteran Studies, University of Utah.

• **Epidemiological Work:** Ongoing work is aimed at understanding emerging threats to psychological and physical health in order to identify modifiable risk and protective factors to enhance readiness. One of the flagship efforts is the prospective longitudinal Millennium Cohort study which includes over 200,000 Service members with matched spouse dyads.
Research Accomplishments/Highlights – PSYCHIATRY & CLINICAL PSYCHOLOGY DISORDERS

- **Treatment for PTSD**: Determining efficacy of PTSD psychotherapies in military populations. Exploring augmented psychotherapies (e.g., Virtual Reality, Cognitive Enhancing Medications), adaptations (e.g., couples/group therapy, tele-behavioral health, intensive outpatient modalities) and novel treatments (e.g., animal assisted psychotherapy, brain stimulation, nutritional neuroprotection, exercise and mindfulness).

- **Compressed PTSD Psychotherapy Regimens**: Demonstrated 3 weeks of daily exposure-based therapy to be equivalent to traditional, 15 weekly sessions care delivery. Findings have the potential to drastically reduce treatment dropout rates.

- **Objective PTSD Screening Tools**: PTSD foundational science research focused on etiology, common co-morbidities, and identification of objective biomarkers (e.g., blood-based, imaging, voice and facial micro-features), and neurological treatment targets.

- **Improving Access to Behavioral Health Care**: Research and development of training programs for improving Soldiers’ understanding of and attitudes toward Behavioral Health will reduce stigma and minimize other barriers to care seeking. Provider training and skill development also seeks to minimize treatment dropout.

- **Family and Social Support for Behavioral Health Care**: Demonstrated that patient dropout from PTSD treatment is significantly reduced if family members and/or friends are aware, supportive, and involved in the delivery of care process.

- **Tools for Behavioral Health Return-to-Duty Decision-making**: Development of standardized psychological measurement practices and identifying critical data points to better support RTD decision making.

- **Psychopharmacological PTSD Treatments**: High-priority research continues to identify novel pharmaceutical interventions for more effective PTSD treatment in military populations.
Military Research Portfolio Drivers

- **Executive Order, 31 August 2012: “Improving Access to Mental Health Services for Veterans, Service Members, and Military Families”**
  - Interagency Task Force established for implementing EO
  - Section 5 of the EO directed DoD, VA, HHS and Education to develop a National Research Action Plan
  - NRAP is a 10 year blueprint for interagency research for enhance the prevention, diagnosis and treatment of TBI, PTSD, and suicide

- **Executive Order 13822 “Supporting our Veterans During Their Transition from Uniformed Service to Civilian Life” January 9, 2018**
  - Requires VA, DoD, and the Department of Homeland Security (DHS) to submit a Joint Action Plan describing actions to provide seamless access to mental health care and suicide prevention resources for separating Service members
  - The EO specifically emphasizes access to services during the critical first year period following discharge, separation, or retirement from military service.
  - Joint Action Plan for Supporting Veterans During their Transition from Uniformed Service to Civilian Life (revised APR2018)

- **Executive Order establishing the President’s Commission on Combating Drug Addiction and the Opioid Crisis (March 29, 2017)**
  - The Commission recommended federal agencies, including HHS, DOJ, DOD, the VA, and ONDCP, should engage in a comprehensive review of existing research programs and establish goals for pain management and addiction research (both prevention and treatment)
Areas of PTSD Research Focus

- Populations of interest: Active Duty Service members, Veterans
- Mechanisms: genetic, physiological/neurochemical, psychological, contextual/environmental factors, & pre-existing conditions
- Translation of cognitive science findings into predictive, testable models
- Identify Biomarkers/bio-signatures for early diagnosis and targeted/precision medicine treatment approaches
- Increase provider adoption of evidence-based interventions
- Develop and evaluate novel and combination interventions to include “non-traditional, alternative” treatment approaches with empirically sound methods
- Expand traditional medicine approaches to prevention and symptom amelioration
- Explore alternative modes of treatment delivery with new emphasis on self-lead application of evidence-based treatments or interventions
- Standardized assessments and common data elements for research are essential
Most “acute” trauma cases will self-resolve but NOT all
  • Variability factors include: Genetics, prior trauma history, coping strategies, frequency and severity of exposure

Symptoms encompass a wide range of functional difficulties

Brain structures and associated neural pathways vary at the individual level, complicating development of a good model for disorder development/maintenance and treatment selection/optimization

Treatment outcomes are highly variable
  • Influenced by intervention choice, symptom severity, patient buy-in/treatment credibility, expectancy for change, age, co-morbid depression and other behavioral health issues

Additional, Service member-specific challenges include:

Treatment seeking is diminished due to military-instilled culture of independence and self care, BH stigma, fear of career damage, and aversion to BH in general and perceived/real challenges inherent to current interventions

Delayed symptom recognition and treatment seeking, onset of frequent co-morbidities (depression, alcohol use disorder, sleep disturbances, metabolic syndrome, diabetes, etc.) further complicate treatment and recovery
Psychological Health Research Continuum
(Portfolio Organization)

Understand

Foundational Science
- Basic discovery science

Epidemiology
- Population-level (to include at-risk) descriptive and characterization in nature; the study of the distribution of associations between health related states

Etiology
- Neurobiological mechanisms of the disease to include possible causes of disorder

Intervene

Prevention and Screening
- Population, indicated prevention/intervention at different stages of illness; screening measures; assessment tools and measurement; training

Treatment
- Aimed at symptom amelioration (includes psychotherapies and drugs) at different stages of illness including refractory, chronic, relapse, relapse prevention; address co-morbidities; follow-up

Implement

Services Research
- Focused on system of care improvements and provider and non-healthcare provider
1. What are main differences between NIH and DoD regarding how to prepare the grant applications? Because MUSC faculty is more familiar with NIH, this explanation will help the faculty understand uniqueness of DoD grant application.

2. Would DOD fund HIV projects? (A: follow PRMRP topic lists)

3. Amount of emphasis on research with military children/families.

4. Is there funding for non-residents or non-citizen?

5. Sometimes a sweeping BAA will come out, but all the 'action' (specific opportunities to respond or apply) comes in the form of addenda that follow the BAA.
   - How can one set up alerts to be notified every time an actionable addendum is issue? *(Link for listserv provided)* What non-peer-reviewed funding mechanisms does DoD have for biomedical research; and what is the best avenue for us to tap into those?

6. How best to inter-relate VA Hospital affiliations into DoD applications? This would appear to be a desired feature of applications, but certain barriers exist, for example, using biological specimens obtained from Veterans that cannot be removed from VA control.

7. Can you have a VA Career Development Award and DOD funding?
8. I'm coming from '0' knowledge, so I am primarily interested in learning about the broad points of what types of grants are available, where to find them, how the applications compare to NIH applications, what are the qualifications/requirements to be able to apply.

9. Guide to apply to DOD grants; Key to success in getting DOD funding

10. Differences between grants and contracts

11. Comment on SBIR/STTR grants for the DOD (link provided)

12. Very interested in any calls for funding that are either public health or health services research-related. How do we go about finding those calls for proposals?

13. Yes, any role for acute renal replacement therapy projects? We work with Nx stage device at MUSC and I engage in CRRT clinical trials.

14. Does DOD sponsor clinical trials for PTSD?

15. Any opportunities for postdoc or staff scientist funding?
Resources

• eBRAP (link to sign up for Listserv) - https://ebrap.org/eBRAP/programSubscription/Subscribe.htm


• CDMRP Tips for Proposal Submission Success - http://cdmrp.army.mil/funding/apply

• CDMRP Research Resources - http://cdmrp.army.mil/about/resources.aspx

• USAMRAA website - https://www.usamraa.army.mil/Pages/Main01.aspx

• DoD SBIR/STTR Website - https://www.acq.osd.mil/osbp/sbir/

• Army SBIR/STTR Website - https://www.armysbir.army.mil/

• Small Business Administration's SBIR/STTR Website - www.sbir.gov
NEWS RELEASE
Released: February 15, 2018

The Defense Health Program
Department of Defense Peer Reviewed Medical Research Program
Anticipated Funding Opportunities for Fiscal Year 2018 (FY18)

Although funds have not been appropriated for the Department of Defense Peer Reviewed Medical Research Program (PRMRP), the PRMRP is providing the information in this pre-announcement to allow investigators time to plan and develop ideas for submission to the anticipated FY18 funding opportunities.

FY18 PRMRP Program Announcements and General Application Instructions for the following award mechanisms are anticipated to be posted on Grants.gov in April 2018. Pre-application and application deadlines will be available when the Program Announcements are released. This pre-announcement should not be construed as an obligation by the Government, and funding of research projects received in response to these Program Announcements is contingent on the availability of Federal funds appropriated for the PRMRP.

As directed by the Office of the Assistant Secretary of Defense for Health Affairs, the Defense Health Agency (DHA) J9, Research and Development Directorate, manages the Defense Health Program (DHP) Research, Development, Test, and Evaluation (RDT&E) appropriation. The managing agent for the anticipated Program Announcements/Funding Opportunities is the Congressionally Directed Medical Research Programs (CDMRP).

Congressionally Directed Topic Areas. All applications submitted to the PRMRP must address at least one of the FY18 PRMRP Congressionally directed topic areas. As of the release date of this pre-announcement, the FY18 PRMRP Topic Areas have not been finalized. This pre-announcement should not be construed as an obligation by the Government to include any of these Topic Areas or others in the FY18 PRMRP. The potential FY18 PRMRP Topic Areas are as follows:

- Acute Lung Injury
- Antimicrobial Resistance
- Arthritis
- Burn Pit Exposure
- Cardiomyopathy
- Cerebellar Ataxia
- Chronic Migraine and Post-Traumatic Headache
- Chronic Pain Management
- Congenital Heart Disease
- Constrictive Bronchiolitis
- Diabetes
- Dystonia
- Eating Disorders
- Emerging Infectious Diseases
- Endometriosis
- Epidermolysis Bullosa
- Focal Segmental Glomerulosclerosis
- Fragile X Syndrome
- Guillain-Barré Syndrome
- Hepatitis B and C
- Hereditary Angioedema
- Hydrocephalus
- Immunomonitoring of Intestinal Transplants
- Inflammatory Bowel Diseases
- Interstitial Cystitis
- Lung Injury
- Malaria
- Metals Toxicology
- Mitochondrial Disease
-Musculoskeletal Disorders
- Myotonic Dystrophy
- Non-Opioid Pain Management
- Nutrition Optimization
- Pancreatitis
- Pathogen-Inactivated Blood Products
- Post-Traumatic Osteoarthritis
- Pressure Ulcers
- Pulmonary Fibrosis
- Respiratory Health
- Rett Syndrome
- Rheumatoid Arthritis
- Scleroderma
- Sleep Disorders
- Spinal Muscular Atrophy
- Sustained-Release Drug Delivery
- Tinnitus
- Tuberculosis
- Vascular Malformations
- Women’s Heart Disease

The mission of the PRMRP is to encourage, identify, and select military health-related research of exceptional scientific merit. Relevance to the healthcare needs of military Service members, Veterans, and their family members is a key feature of each FY18 PRMRP award mechanism.
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