Occupational/Environmental Health & Performance

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CAPT C. Douglas Forcino
Director, Military Operational Medicine Research Program
Chair, Joint Program Committee 5 for Military Operational Medicine
US Army Medical Research and Materiel Command
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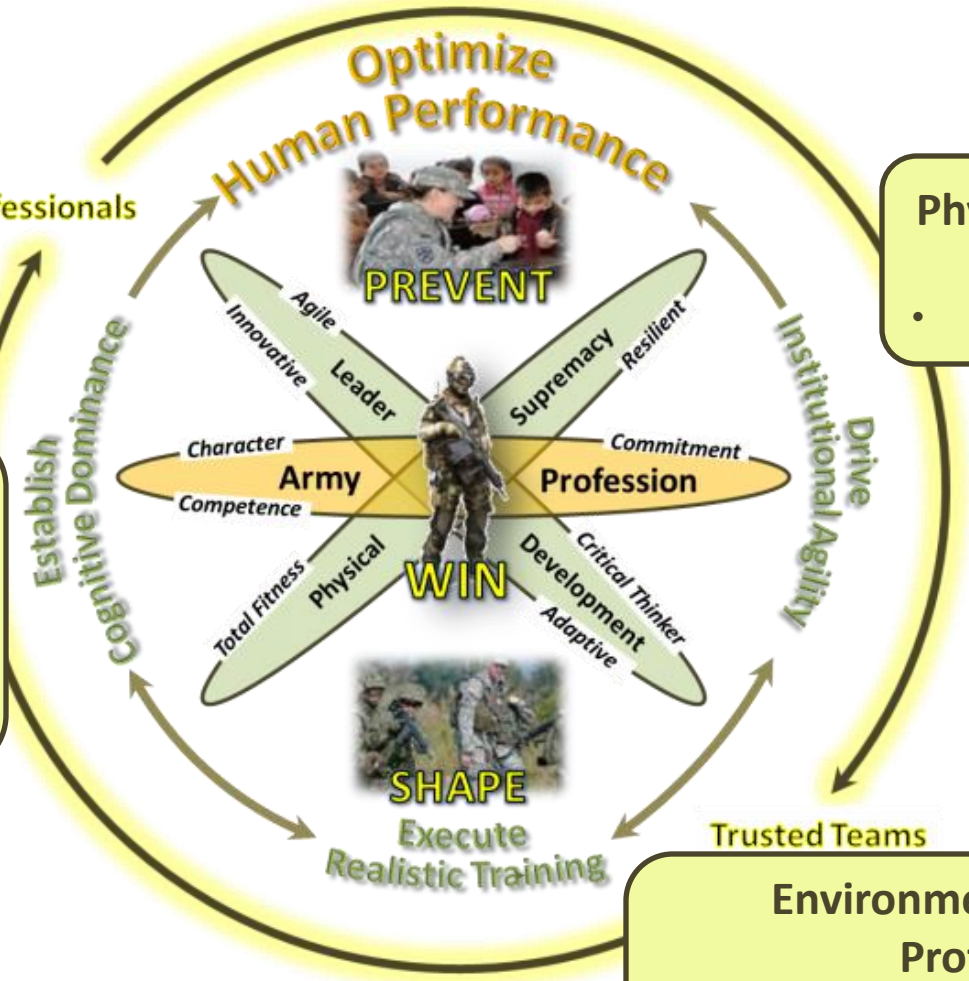
Military Operational Medicine



Physiological Health & Performance:

- Nutrition

Injury Prevention & Reduction:

- Blast-related injury
- Musculoskeletal injury
- Ocular/facial injury
- Auditory and vestibular injury

Environmental Health & Protection:

- Real-time physiological status monitoring
- Performance in extreme environments
- Health effects of nanomaterials

*The Human Dimension White Paper, United States Army Combined Arms Center, 9 October 2014

PANEL MEMBERS

- Dr. Stephen Muza-Environmental Health and Protection Research Program

- Dr. Scott Montain-Military Nutrition Research Program

- Mr. Steven Hawbecker-Real-Time Physiological Status Monitor (RT-PSM)

Military Operational Medicine Environmental Health and Protection Research Program

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Stephen R. Muza, Ph.D.

Chief, Environmental Medicine and Military Performance Division

US Army Research Institute of Environmental Medicine

24 March 2015

Purpose

To increase understanding of the Army's requirements to sustain health and performance in environmental extremes.

- Points
  - *Disease and Non-Battle Injury (DNBI) are largest cause of medical casualties*
  - *Heat, Cold, High Altitude, and Occupational Chemical Environmental Stressors substantially degrade Soldier performance and health*
  - *Countermeasures to mitigate environmental stressors*
  - *Science and Industry opportunities*

Environmental Stressors R&D

1. **Harsh environmental conditions (heat, cold, high altitude), alone or combined with operational stressors, degrade military (physical and cognitive) performance and induce acute injuries and long-term disabilities.**

2. **The overall goal of this research program area is to develop:**
   - **accurate predictive models of environmental stressors (risk assessment)**
   - **countermeasures to mitigate the risks (i.e., hydration, acclimation procedures, pharmaceuticals, etc.)**
   - **real-time individual physiological monitoring to optimize performance and mitigate injury**

Heat Stress

Needs:

- Individualized acclimation assessment
- Real-time physiological monitoring
- Whole body hydration monitoring
- Portable, low-power microclimate cooling
- Pharmaceuticals to treat heat stroke/illness
- Biomarkers of recovery from heat stroke/injury

Cold Stress

Needs:

- Individualized risk prediction
- Real-time physiological monitoring
- Portable, low-power microclimate heating
- Pharmaceuticals / nutriceuticals to prevent or treat cold injury

High Altitude Stress

Needs:

- Individualized acclimatization assessment
- Real-time physiological monitoring
- Pharmaceuticals / nutriceuticals to prevent mountain sickness and/or performance decrements
- Portable, low-power oxygen delivery

Military Nutrition Research Program

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Scott J. Montain, Ph.D.

Chief, Military Nutrition Division

US Army Medical Research and Materiel Command

24 March 2015

Purpose

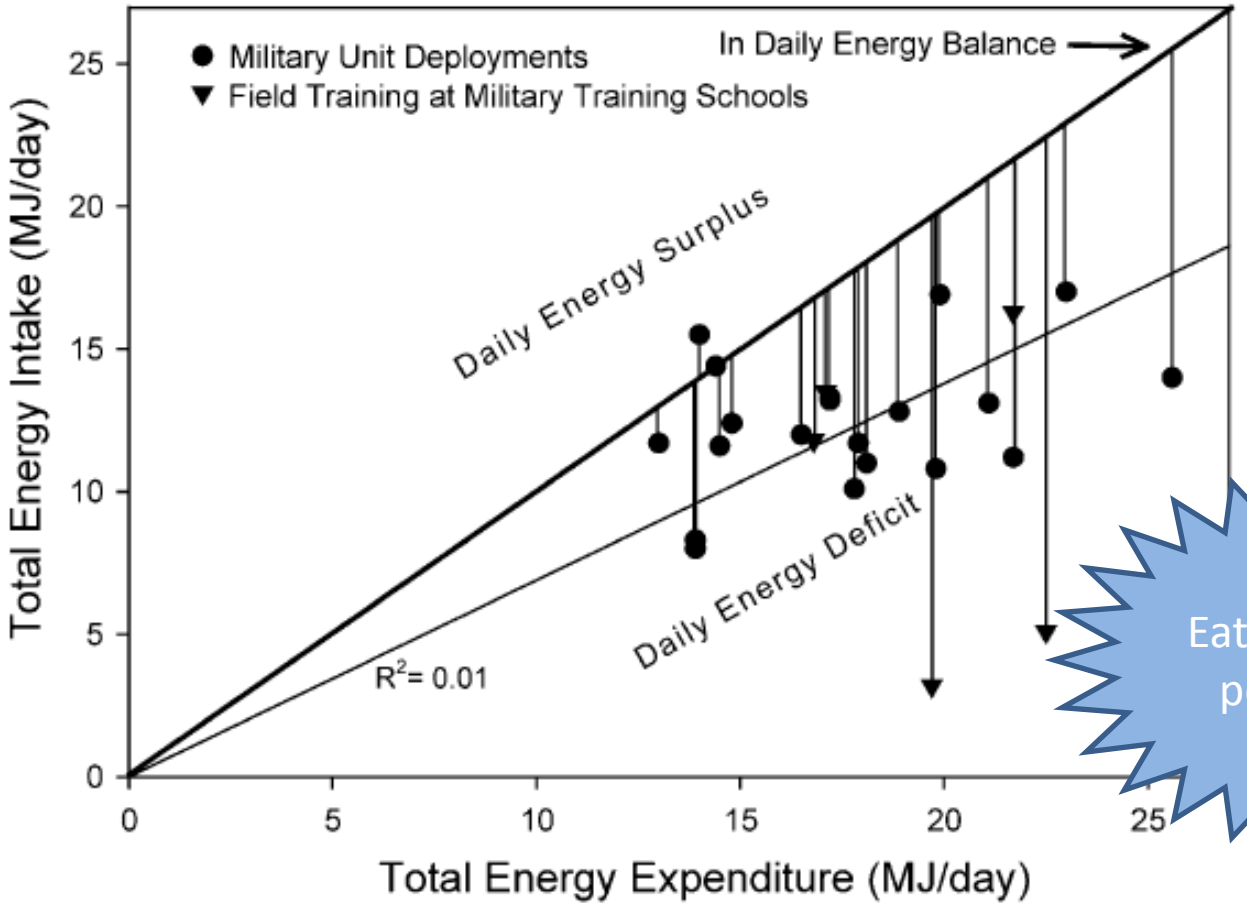
To increase understanding of our nutrition research program and to identify where there are opportunities for industry partnership/support.

- Points
  - *We don't make rations.*
  - *We do work with academic partners and industry*

Mission

Conduct research that provides a biomedical science basis for developing new rations, menus, policies and programs that enable Warfighter health-readiness and optimal performance.

Driver: Under eating



Eat as time permits

Challenge: Field Rations

The MRE™ is the cornerstone of individual rations and is used by all the Services

- 3 MREs™ per day equal a day's worth of subsistence
  - 1250-1300 calories per meal

  (13% protein, 34% fat, 53% carbohydrate)
- 24 Menus (4 vegetarian)

- Must be shelf stable for 3 yrs at 80°F (27°C) & 6 months at 100°F (38°C)
- Cost Constrained

Solution Oriented

- Field Rations
  - Continuous Improvement of the Meals, Ready to Eat
  - First Strike Ration® (FSR™)
  - Modular Operational Ration Enhancement™

Over 260 new ration items have been introduced since 1993

Research Program Areas

- Recovery Nutrition
  - Protein requirements
  - Essential fatty acids
- Healthy Eating
- Nutritional Neuroprotection
- Physiological Resilience

The Program

- Span: Basic and Applied Science
- Models: Cell Culture ⟶ Small Animal ⟶ Human
- Laboratory and Field Experimentation

Opportunities

- Methods
  - Gut microbiome sampling
  - Approaches for assessing metabolic state/flux in field situations
- Nutrition
  - Approaches for stabilizing nutrients in complex matrix

Real-Time Physiological Status Monitor (RT-PSM)

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Mr. Steven E. Hawbecker

Project Manager, Medical Support Systems

US Army Medical Research and Materiel Command

24 March 2015

Purpose

To increase understanding of real-time physiological status monitoring of dismounted Soldiers.

- Army Requirements for the RT-PSM
  - *Open architecture*
  - *Monitors and records basic vital signs of Soldiers*
  - *Secure wireless communication with Leaders and Medics*
  - *Creates actionable information for Leaders to make an informed decision*
  - *Small, lightweight, and lasts for an extended duration*

Research to Accomplish

MRMC must improve current commercial technologies to meet Army requirements.

1. Improve Actionable Information Provided
   - *Currently provides heart-rate, respiration rate, and body position*
   - *Must provide core body temperature, skin temperature, hydration status, oxygen levels, and blood loss*

2. Improve Communication Medium for Secure Wireless
   - *Currently using Bluetooth Low Energy (BTLE)*
   - *Ultra-wide Band and Tunable Narrow Band are more secure*

3. Improve Size, Weight, and Power (SWAP)
   - *Currently runs continuously for 8 hours*
   - *Must run continuously for 72 hours, requires less power consumption and size reduction*

Open Architecture

Integrated Soldier Sensor System (ISSS)

ISSS is an integrated system of body-worn sensors that monitors and records head accelerations and blast overpressure during an energetic event, as well as monitors and displays real-time physiological status such as heart rate, core body temperature and heat stress

Questions?

For additional questions after the conclusion of the conference, send an email message to usarmy.detrick.medcom-usamrmc.mbx.mmpd@mail.mil