



### Location/Facilities

USARIEM is co-located with Natick Soldier Systems Center in Natick, Massachusetts. Located a short distance from Boston, the institute has unique facilities and is in close proximity to many of the finest universities and medical research centers.



### Experimental Capabilities:

**Metabolic:** environmental chambers, dietary assessment, indirect calorimetry, doubly labeled water for energy expenditure, stable isotopes/metabolic flux

**Body Composition:** DEXA (human & small animal), total body water, bone biomechanics

**Performance:** cardiorespiratory responses to maximal & submaximal exercise, cognitive testing, vigilance/sleep/activity monitoring

**Association of Assessment & Accreditation of Laboratory Animal Care:** animal care & surgery

**Biomechanical and Molecular:** analysis of mRNA & protein contents from both human & small animal models. Phospho-protein & cytokine analysis using LUMINEX technology. Micronutrient analysis using atomic absorption spectroscopy



## Select Recent Scientific Publications

Karl, J.P., Lieberman, H.R., Cable, S.J., Williams, K.W., Young, A.J. & McClung, J.P. (2010). Randomized, double-blind, placebo-controlled trial of an iron-fortified food product in female soldiers during military training: relations between iron status, serum hepcidin, and inflammation. *American Journal of Clinical Nutrition*, 92, 93-100.

Karl, J.P., Young, A.J. & Montain, S.J. (2009). Eating Slowly Does Not Modify the Endocrine Response to a Meal or Satiety. *Obesity*, 17, S255.

Lieberman, H.R., Stavinoha, T.B., McGraw, S.M., White, A., Hadden, L.S. & Marriott, B.P. (2010). Use of dietary supplements among active-duty US Army soldiers. *American Journal of Clinical Nutrition*, 92, 985-995.

McClung, J.P., Karl, J.P., Cable, S.J., Williams, K.W., Young, A.J. & Lieberman, H.R. (2009). Longitudinal decrements in iron status during military training in female soldiers. *British Journal of Nutrition*, 102, 605-609.

Montain, S.J., Baker-Fulco, C.J., Niro, P.J., Reinert, A.R., Cuddy, J.S., & Ruby, B.C. (2008). Efficacy of eat-on-move ration for sustaining physical activity, reaction time, and mood. *Medicine and Science in Sports & Exercise*, 40, 1970-1976.

Montain, S.J., Carvey, C.E. and Stephens, M.B. (2010) Nutritional fitness. *Mil Med*, 175: 65-72.

Pasiakos, S.M., McClung, H.L., McClung, J.P., Urso, M.L., Pikosky, M.A., Cloutier, G.J., Fielding, R.A. & Young, A.J. (2010). Molecular Responses to Moderate Endurance Exercise in Skeletal Muscle. *International Journal of Sport Nutrition and Exercise Metabolism*, 20, 282-290.

Scrimgeour, A.G., Marchitelli, L.J., Whicker, J.S., Song, Y., Ho, E. & Young, A.J. (2010). Phytase supplementation increases bone mineral density, lean body mass and voluntary physical activity in rats fed a low-zinc diet. *Journal of Nutritional Biochemistry*, 21, 653-658.

Smith, T.J., Margolis, L.M. & Young, A.J. (2010). Should Military Dining Facilities Offer and Promote Consumption of Probiotic-Containing Foods? *Military Medicine*, 175, 770-783.



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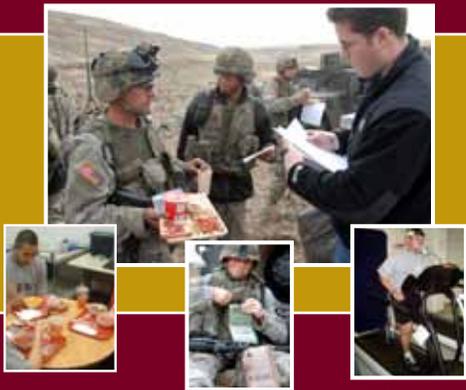
# Military Nutrition Division

**Natick, Massachusetts**



# United States Army Research Institute of Environmental Medicine

USARIEM is an internationally recognized center of excellence for Warfighter performance science and its useful applications. The institute functions as a world-class laboratory for environmental medicine, physiology, health and nutrition research. It features integrated cellular, tissue, and human research programs.



## Military Nutrition Division

*Division Chief: Andrew J. Young, Ph.D.*

Conducts research on nutritional issues affecting the health and mission-readiness of Service Members, and supports the Surgeon General's responsibilities as the DoD executive agent for nutrition. Evaluates new combat rations and examines interactions between nutrition, health, performance and the operational environment.



## Primary Research Areas

- Bioenergetics & Metabolism
- Warfighter Nutritional Requirements
- Combat Ration Testing
- Dietary Supplements



## Research in Progress

- Dietary fatty acids and resiliency to mTBI in rats
- Effects of energy deficit and various levels of protein intake on whole-body and skeletal muscle protein turnover
- Cognitive effects of caloric and sleep deprivation combined with strenuous aerobic exercise
- Optimizing micronutrient status for health and performance during military training
- Development of a precise and comprehensive database of ration nutrient composition
- Assessment of dietary supplement and caffeine intake in the US Armed Forces
- Modifying food service in military dining facilities to foster healthy eating behavior and food choices by Warfighters

## Future Objectives & Challenges

### Operational Nutrition & Metabolism

- Exercise metabolism and dietary "fueling"
- Nutrient requirements for cognitive work
- Diet and endocrine modulation of satiety and hunger
- Safety and efficacy of dietary supplements for Warfighters

### Nutrition and Recovery

- Metabolic recovery from intense physical and cognitive stress
- Nutritional facilitation of recovery from injury and illness

### Nutritional Fitness

- Nutritionally enhanced resilience to injury, disease & infection
- Identifying, screening & modulation of risk factors associated with excess body weight
- Dining facility interventions to optimize Warfighters' health and operational readiness

### Ration Sustainment Testing

- Assessment of precise nutrient intake of the Warfighter
- Nutritional adequacy of new combat rations

## Military Nutrition Division's Contribution to Products

Ration & Supplements  
First Strike Ration, Hooah, Ergo



## Doctrine & Training



Performance  
Enhancing  
Food Additives



Nutrient Delivery  
System

