Consortium for Health and Military Performance:
Fiscal Year 2015 Annual Report
LEADERSHIP

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Dear Stakeholders:

The 2015 Annual Report for the Consortium for Health and Military Performance (CHAMP) demonstrates the range and value of our programs, services, and new initiatives. CHAMP continues to provide Service members, their families, providers, and commanders with expert, integrated, holistic, evidence-based information and advice on many aspects of health and performance. Along with our ongoing programs, CHAMP pursues several projects in response to requests from the Department of Defense, all four Services, and other military sources. Our primary areas of focus this year included:

- **Total Force Fitness**: Strategies and practices to enable and reinforce behaviors shown effective in supporting Total Force readiness, resilience, and fitness.

- **Musculoskeletal injury (MSK-I) Prevention and Rehabilitation**: Subject-matter expertise and resources made available through CHAMP’s Human Performance Resource Center (HPRC) website (hprc-online.org).

- **Operation Supplement Safety (OPSS)**: A website (hprc-online.org/dietary-supplements/opss) that provides a variety of information and tools regarding dietary supplements, including safety warnings, access to a supplement database, and the ability to ask experts questions about dietary supplements. OPSS also pushes out the latest information on dietary supplements when important issues arise.

- **Go for Green® (G4G)**: A DoD-wide nutrition program. By making more nutritious choices available (e.g., through improved menus and food placement) and marketing them, G4G nudges service members to make better food and beverage choices, in order to optimize performance, readiness, and health.

- **Predispositions to Heat-Related Illness**: Holistic, evidence-based identification, prevention, treatment, and return-to-duty testing of heat tolerance and examination of genetic disorders that predispose Service members to exertional heat illness (EHI).

- **Women in Combat**: Epidemiology and basic-science research in combat-related concerns made more urgent by SECDEF’s decision to allow women to join all combat occupational specialties in 2016.

- **Global Health Engagement (GHE)**: Strategies to ensure that DoD’s leaders understand the role and importance of Human Performance Optimization as a framework relevant to policies and practices for GHE.
In FY15 CHAMP developed and sustained a wide range of HPO resources for Service members and their families, commanders, and providers. We also initiated several research projects to address important unanswered questions related to HPO. Those areas include:

- **Rehab, Refit, Return to Duty (Rx3):** Web-based delivery of information and resources for treatment and rehabilitation of key musculoskeletal injuries for Service members and providers.

- **Combat Rations Database (ComRaD):** An online database with detailed nutrition information for most standard military operational rations, accessible to providers, commanders, and Service members.

- **Support of United States Special Operations Command Preservation of the Force and Family (POTFF):** A POTFF website is in development, to provide USSOCOM families with a one-stop shop for resources aligned with the four domains of the POTFF program (physical, psychological, social, and spiritual performance). CHAMP also helps evaluate existing POTFF programs designed to improve psychological health.

- **Exercise Collapse Associated with Sickle-Cell Trait (ECAST):** A research project funded by the National Heart, Lung, and Blood Institute to conduct epidemiology and genetic research on the relationship between sickle cell trait and exertion-related events. ECAST results will provide an evidence base for military screening practices and treatment guidelines on heat- and exertion-related illnesses.

We are proud of CHAMP’s contributions to the health and resilience of our Service members and their families, and we look forward to serving you and the Nation in the coming year.

*Patricia A. Deuster*

Director, Consortium for Health and Military Performance
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I Mission And Vision

The mission of the Consortium for Health and Military Performance (CHAMP) is to conduct and translate basic and clinical research in military human performance, so as to inform the development of educational products, clinical products, clinical care pathways, operational guidelines, and health policies. The goals of these efforts are to maximize deployability, expediting warrior return to duty, and optimizing resilience and performance of the military community.

CHAMP’s vision is to be the premier Department of Defense (DoD) translational biomedical resource in the area of military-unique Human Performance Optimization (HPO) for maximizing warrior performance in the operational environment and resilience of the global military family.
II Background And Environment

The Past: Human Performance Optimization (HPO)

Over the past decade, economic and political factors have not only increased the challenges of warfighting, but placed a premium specifically on optimizing the human weapon system. In response, DoD has made addressing the stresses faced by both warriors and their families a top priority. Those stresses are to be identified and met through new education and training initiatives as well as prudent enhancement of more traditional methods.

In 2005, the Office of Net Assessment released a report entitled “Human Performance Optimization and Military Missions.” That report identified a critical need to further understand and develop components of HPO as an element of meeting the requirements of Force readiness. The next DoD Quadrennial Review (2006) further identified the need to promote warrior wellness by applying emerging technologies, emphasizing that the Total Force must be maximally prepared to adapt rapidly to different, high-tempo operating environments with far more endurance and resilience than in the past.

In response to the 2005 ONA report, Dr. William Winkenwerder, Jr., then Assistant Secretary of Defense for Health Affairs, tasked Dr. Charles Rice, President of the Uniformed Services University (USUHS), with hosting a workshop initiating development of a strategic plan for HPO within the military. In turn, Dr. Rice tasked CHAMP as USUHS’s organizer and host. In June 2006, workshop participants from across DoD assessed the challenges facing the Military Health System in its efforts to optimize warrior performance. The group identified several significant gaps, including the needs to:

• Ascertain DoD and service-specific HPO requirements.
• Establish effective communication and coordination within medical, research, and operational communities across all military services.
• Develop valid, standardized metrics for HPO.
• Translate HPO research for the operational communities.
• Advocate for HPO concerns at all levels of DoD.

Over the next three years, a variety of DoD working groups and teams reached consensus on what the gaps were, which led to the development of the DoD Human Performance Optimization Health Sciences Concept of Operations (HPO CONOPS). The HPO CONOPS, approved on 10 December 2009 by the DoD Force Health Protection Integration Council, called for the establishment of a DoD HPO Health Sciences Advisory Committee and a DoD Human Performance Resource Center (HPRC), hosted and managed by CHAMP as an element of USUHS.
Meanwhile, CHAMP had emerged as a major source of solutions to many of the HPO gaps the HPO CONOPS identified. For example, in 2009 the Chairman of the Joint Chiefs of Staff, ADM Michael Mullen, tasked CHAMP to host a joint workshop on Total Fitness for the 21st Century. He recognized the toll taken by the extraordinary duration of the present war and the multiple long deployments and advocated for a paradigm shift in how DoD views its human resources. The CHAMP workshop developed the concept of Total Force Fitness (TFF), shifting the HPO paradigm toward a more holistic view of Service members, their families, their units and communities, and, by extension, a deep shift in DoD’s approach to its human-resource commitments. On 1 September 2011, TFF was incorporated into CJCSI 3405.01 (Chairman’s Total Force Fitness Framework), and CHAMP’s main mission became providing the best evidence-based, holistic support for Service members and their families, units, and communities.

Similarly, the 17 November 2011 Force Health Protection (FHP) CONOPS DOTmLPF-P Change Recommendation (DCR) reiterated the need for centralized HPO knowledge management across all of DoD as a major capability gap. The 2010 and 2014 QDRs also emphasized the importance of supporting warriors and their families in reaffirming DoD’s commitment to the health and resilience of the nation’s fighting force as the foundation of our national defense. These QDRs also stress the need to use emerging knowledge and technology to maximize warrior wellness. The 2014 QDR particularly emphasizes commitment to ensuring and sustaining the wellness, endurance, and resilience of U.S. forces and, as a consequence, to sustaining the personnel and knowledge required to provide the best available health advice and support.

Based on these developments, leaders across MHS encouraged USUHS and CHAMP to seek CoE status as an integrated part of military medical education and research and a recognized subject-matter expert on HPO, TFF, and other readiness concerns. In November 2012, the CoE Oversight Committee designated CHAMP as an MHS CoE. CHAMP now serves as the unifying force across all Services on issues related to HPO science and translation.

The Present: Human Performance Optimization (HPO)

As a CoE, CHAMP addresses a broad range of factors that contribute to TFF, primarily but not exclusively through HPO. CHAMP provides original research and develops subject-matter experts as well as critically assesses results, opinions, and materials generated by others.

CHAMP continues to support DoD efforts to eliminate siloed and redundant HPO research, analysis, and educational efforts; to facilitate the exchange of information within and across separate Military and Military Health Services, Joint Staff, Health Affairs, and other components of the Office of the Secretary of Defense (OSD); to promote joint and inter-/intra-service collaborative research; and to promulgate evidence-based HPO practice recommendations based on Military Service requirements.
As an integrated component of USUHS’s health science programs, CHAMP is well situated to shift the mindset of those actively engaged in caring for Service members across all four services. CHAMP’s contributions to the USUHS curricula explicitly incorporate DoD’s new paradigm for responding to emerging challenges in HPO and TFF. It teaches the importance of an evidence-based, holistic approach, ensuring that students learn how to consider evidence and practices critically and their patients and MHS holistically.

The quality and direction of USUHS education has a deep, pervasive, and lasting effect on MHS. USUHS has produced an average of 170 MHS physicians each year since the early 1980s. For the last two decades, masters and PhD alumni in the Graduate School of Nursing have made up a significant component of the Nurse Corps. USUHS graduates also tend to stay in uniform longer. For instance, 74–85% of its MD alumni reach the 12-year mark and 41–48% remain on active duty for 30 years or more. CHAMP’s integrated role in USUHS’s MPH, DrPH, and PhD programs can influence the direction of military-relevant biomedical research, both inside and outside of DoD, as well as enhance recruitment and retention of holistically trained researchers.

Lastly, although CHAMP convened an External Advisory Board (EAB) when it became a CoE, it was this year the EAB was formalized in a charter, which was approved by DoD-ASD(HA) in July 2015. CHAMP’s EAB meets twice a year to provide strategic advice on existing and potential programs and services, methodologies, and approaches for meeting DCoE and CHAMP performance measures (outlined below), and future directions for research and service. Members include:

- Director, CHAMP
- Director, U.S. Army Public Health Center
- Director, U.S. Navy/Marine Corps Public Health Center
- Command Surgeon, U.S. Air Force Air Combat Command, Medical Operations Command, or equivalent
- Medical Officer, Marine Corps
- Command Surgeon, SOCOM
- Commander, USAMRMC
- DASD, Health Readiness Policy and Oversight
- DASD, Health Sciences Policy and Oversight
- Senior Enlisted Advisor to the Chairman of the Joint Chiefs of Staff
- Senior Enlisted Advisor, Office of the Undersecretary of Defense (Personnel & Readiness)
- Senior Enlisted Advisor, Defense Health Agency
- Senior Enlisted Advisor, USUHS
• Director, National Center for Complementary and Integrative Health, National Institutes of Health
• Director, Center for Food Safety & Nutrition, U.S. Food and Drug Administration
• Chief, Supplemental Nutrition Assistance Program, Evaluation Branch, U.S. Department of Agriculture

Environment Scan

No other center—whether within DoD or in other governmental agencies—was identified that engages in diverse objectives equivalent to those of CHAMP. CHAMP is both integrative and collaborative. It provides high-quality, critical, evidence-based assessments of findings and recommendations and conducts original research to identify and fill important gaps in existing knowledge, thereby extending the range of both abstract knowledge and practical applications. CHAMP collects guidance and research from across several clinical and research communities, assessing methods and results; identifies gaps to conduct and incorporate its own focused research; and makes the best evidence-based practices and guidance available to a broad array of users across the Total Force. As part of this process, CHAMP has established a variety of working relationships with many programs also engaged in these and related issues. (See Section V: Performance Highlights.)

Although some Services and Reserve/Guard units have websites that overlap some of the activities of CHAMP’s Human Performance Resource Center, they typically draw on CHAMP’s expert guidance and educational materials. Such websites include:

• Comprehensive Soldier & Family Fitness (http://CSF2.army.mil)
• Army Performance Triad (http://phc.amedd.army.mil/topics/campaigns/perftriad)
• Guard Your Health (http://www.guardyourhealth.com—for Army National Guard only)
• Air Force FitFamily (http://www.usaffitfamily.com/home)

CHAMP has an especially strong presence in supporting the CSF2 website, which serves soldiers, families, and Army civilians. CHAMP assists with CSF2 content, metrics and evaluation, and online links. We are also their go-to for Ask the Expert questions, and we are working with the Army to refine the Global Assessment Tools.

Likewise, CHAMP has several key staff members on the Army Performance Triad team. Although we have no direct role in supporting the Guard Your Health website, it draws all of its information on dietary supplements from the work of CHAMP’s HPRC. Unfortunately, the Air Force website for families is virtually an unknown. We have no analytics on its use or sources but have ascertained through multiple Air Force contacts that the Air Force medical community knows little to nothing about it.
Our aim is to maximize and coordinate the reach, accuracy, and effectiveness of all such efforts, eliminating redundancies by critically consolidating sources and resources while optimizing practical knowledge and guidance to suit the requirements of each of the Services.

**Major Issues**

CHAMP is currently working on a number of issues important to force readiness and health protection, including several with implications for women in combat.

**Musculoskeletal Injury (MSK-I)**

MSK-I is a leading cause of morbidity and lost duty time in training and deployed military populations. MSK-I is a significant burden for the Military Health System as well as notably diminish combat readiness. The costs associated with medical care, lost duty time, and the increased likelihood of disability due to MSK-I during training and deployment are tremendous.

Our Rehab, Refit, Return to Duty (Rx3) project was initially funded by the Air Force to address MSK-I and related issues. CHAMP provides subject-matter expertise and resources via its HPRC website by allowing clinicians to ask HPO-related clinical questions and receive prompt, evidence-based answers based on current practice guidelines (CPGs) and the scientific literature. Rx3 both answers questions on an individualized basis and provides its own multimedia content about exercise prescription, MSK-I rehabilitation, and strategies designed to optimize overall health and performance. In particular, CHAMP has developed standardized solution sets (algorithms for diagnosis, treatment, and maintenance) for the top commonly encountered MSK-I and conditions, with guidelines for the physician and patient. If additional funding is secured for Rx3, we will test the value of the algorithms, as Clinical Practice Guidelines and further resources for MHS providers will be developed accordingly.

Dr. Sarah de la Motte was recently funded for a project entitled “Reducing Injuries with Training Enhancement, Targeted Rehabilitation and Core Conditioning.” Planning and administrative actions began in late FY15, and the study will start in FY16; we will look at integrating functional movement into regular training to reduce MSK-I in Marines during Infantry training.

**Operation Supplement Safety**

Unsafe dietary supplements are a clear threat to readiness in DoD. More than 70% of active-duty Service members take some type of supplement. About 20% of our Service members take performance-enhancing, bodybuilding, and/or weight-loss supplements, many of which FDA has expressed concerns about as potentially unsafe. Service members have suffered serious adverse events after taking supplements with dangerous ingredients, to include liver failure, seizures, cardiac events, and even death.
In 2010, CHAMP raised concerns to MHS about the safety of supplements containing DMAA. The following year DoD placed all dietary supplement products containing DMAA on medical hold (could not be sold on bases) because of suspected adverse events. This action led Dr. Jonathan Woodson, as ASD-HA, to call for an initiative to educate Service members, leaders, providers, and military families on how to make smart supplement choices. OPSS emerged to execute that charge: it makes the best evidence-based information available to families, commanders, and healthcare providers. As the lead for OPSS, CHAMP and its HPRC interact with a wide array of other federal agencies to protect our service members from harmful ingredients in supplements.

**Sickle Cell Trait**

Screening for sickle cell trait (SCT) status is of interest to the nation as a whole as well as to DoD, chiefly due to the relationship between SCT status and exertion-related events (ERE) that emerged many years ago in both the military and civilian literature.

Currently, the Air Force and Navy/Marines screen for SCT but the Army does not. That difference reflects the considerable medical and ethical controversy over whether screening should be mandatory and, if so, what to do when someone is identified as SCT+. While the majority of evidence available is anecdotal, the National Collegiate Athletic Association (NCAA) requires each of its athletes to be screened; those who are positive are closely monitored for the rest of their college athletic careers. By contrast, the Army decided not to screen soldiers for SCT because it recognized almost 20 years ago that any untoward risk could be mitigated by appropriate precautions.

CHAMP has been funded by the National Heart Lung and Blood Institute (NHLBI) to conduct a large epidemiological evaluation and examine SCT genetics/genomics with a focus on its relationship to ERE. The main goal of that project is to contribute to the scientific evidence base essential for the development of SCT policy.

**Operation Live Well and Total Force Fitness**

Operation Live Well (OLW) is a program promoted by MHS and the Office of the Under Secretary of Defense for Personnel and Readiness in response to the CJCSI on TFF. OLW is the framework for executing TFF, which has been embraced by Congress in response to a FY14 program, Healthy Base Initiative.

The FY2016 Senate Appropriations Committee for Defense (SAC-D) Health Program Report Provisions have endorsed CHAMP as the lead organization both in evaluating the integration of Total Force Fitness and Healthy Base Initiative. Under the SAC-D proposal, CHAMP would support base and community leaders in transforming strategies and practices that enable and reinforce human behaviors shown effective in supporting readiness, resilience, and fitness. It would also perform aggressive outreach to leaders of participating sites in a rapid-cycle improvement process and develop a common set of measures and metrics to determine, institute, and promote improvement strategies and support value decisions.
**Exertion Related Events (ERE)**

Exertion-related events (ERE), which include exertional rhabdomyolysis, heat injuries, exercise intolerance, syncope, and collapse associated with SCT, are of great concern to all the Services because of the financial costs of limited duty, as well as the potential consequences for Service members and their families. The exact costs, both operational and financial, have not yet been clearly delineated, but we know they are both complex and can result in severe disabilities. In some cases, the consequences are life threatening.

CHAMP has been the DoD resource for ERE for over a decade by providing clinical consultations on ERE-based concerns for all providers. In the past year alone, 15 MHS physicians requested CHAMP consultations in cases of complex heat stroke or exertional rhabdomyolysis. CHAMP collaborates in the appropriate clinical and functional testing for each case and provides expert, evidence-based advice.

ERE is currently an unfunded effort. Its services are advertised mostly by word of mouth among MHS physicians, but we are not convinced that the referral network reaches all those who would benefit from ERE consultations.

**Women in Combat**

Women will be allowed to join all combat occupational specialties as of 1 January 2016 based on the SECDEF's decision in January 2013 to rescind the ground combat exclusion rule for women. This action opened the door for women to serve in more than 14,000 additional occupations and assignments involving exposure to direct ground combat. The Joint Chiefs of Staff (JCS) directed the Services to develop integration plans—with full implementation to occur no later than 1 January 1 2016—in keeping with JCS guidelines and objectives.

CHAMP has been involved with Women in Combat for several years. The outcomes of a 2014 CHAMP workshop on Women in Combat will be highlighted in a Military Medicine Supplement in January 2016. CHAMP is also part of the new JPC5 working group on Women in Combat and has been funded in FY16 to initiate research investigating MSK-I in women combatants and their overall health and resilience.

**Go For Green® (G4G)**

The concept behind Go For Green® emerged from multiple Survey of Health Related Behaviors and other DoD questionnaires, which jointly established that the dietary patterns of most Service members are less than optimal, particularly with regard to fresh fruits and vegetables. Go for Green® is a DoD-wide nutrition program intended to help individuals across the military community identify healthy foods and beverages via a green, yellow, and red stoplight coding system, where foods coded as green should be consumed frequently and foods coded as red should be kept to a minimum. In development for the past few years, Go for Green® has been inconsistently implemented, in part because it has lacked the resources required to standardize its marketing materials.
Over the last year CHAMP has contributed substantively to updating G4G materials and practices to create Go for Green* 2015. Through revisions across the program we have remedied previous weaknesses by introducing new, evidence-based food standards; a standardized approach for DFAC implementation; and creation and maintenance of high-quality, standardized marketing materials. The U.S. Army is currently evaluating Go for Green* as part of the Performance Triad Evaluation. However, Go for Green* has been a no-funds effort from its inception.
III Strategic Goals, Objectives, And Priorities

CHAMP’s aims include the discovery of new knowledge and development of new materials and applications, but we are equally committed to sustaining our commitment to meeting ongoing needs for subject-matter expertise and integrative, evidence-based information. In the latter cases, the objectives themselves remain fairly stable over time.

CHAMP uses a Balanced Scorecard (BSC) to drive its tactical, operational, and strategic actions and achieve its mission and vision. The CHAMP BSC approach is comprised of a map (Figure 1), with strategic themes, ways, means, and ends. The endstate is: 1) an integrated World Class DoD HPO Community of Practice; and 2) a trusted resource for DoD TFF and HPO Expertise. Our strategic themes are in line with our mission and endstate, creating new knowledge for human application, translating evidence-based science, optimizing communication and knowledge management, and building and valuing diverse teams. We also have supporting metrics to track and guide our efforts. This approach ensures our organizational efforts are consistent with our mission, vision, and strategic themes.

CHAMP’s BSC is tied to our strategic framework, which is consistent with the Strategic Frameworks of USUHS and its School of Medicine. The five mission domains for USUHS are education and training, research and scholarship, global health engagement, service, and leadership. Within each of these domains are key topics and focus areas. For example, education must be integrated, state-of-the-art, competitive, and stimulating, and service-focused. Likewise, research and scholarship should focus on basic, translational, clinical, system, and operational population-health-based or policy research. CHAMP has aligned its conceptual framework and program execution with these strategic themes.

VISION

CHAMP’s vision is to be the premier Department of Defense (DoD) translational biomedical resource in the area of military-unique Human Performance Optimization (HPO) for maximizing warrior performance in the operational environment and resilience of the global military family.

MISSION

CHAMP’s missions is to conduct and translate basic and clinical research in military human performance, so as to inform the development of educational products, clinical products, clinical care pathways, operational guidelines, and health policies. The goals of these efforts are to maximize deployability, expediting warrior return to duty, and optimizing resilience and performance of the military community.
CHAMP’s strategic framework and BSC are also consistent with and aligned to the Military Health System’s (MHS) Strategy Map. Figure 2 provides a snapshot of how some of our metrics are aligned with MHS.
FIGURE 2. CHAMP’s Alignment to the Military Health System’s Strategic Map

In our BSC we present CHAMP’s strategic objectives to meet its goals. Following is a summary of our goals and objectives, in order of our strategic themes, divided into the short, medium, and long term only where appropriate.
STRATEGIC GOAL 1: Research and Scholarship

*Create high-quality new knowledge for human applications.*

Identify crucial knowledge gaps and conduct basic, clinical, and translational research in the field of HPO, Total Force Fitness, and Exertion-Related Events (ERE), especially regarding optimal operational performance and safely enhancing performance of mission-essential functions.

**Short-Term Objectives:**
1.1 Improve prevention and treatment of and recovery from ERE.
1.2 Execute DoD-funded/unfunded HPO projects

**Medium-Term Objectives:**
1.3 Develop an evidence base for policy on screening for sickle cell trait and a process for mitigating potential risk.
1.4 Identify biomarkers for susceptibility to ERE.
1.5 Develop approaches for assessing health risks of dietary supplement ingredient combinations.

**Long-Term Objectives:**
1.6 Determine impact of alternative therapies on psychological health.
1.7 Optimize scientific impact and reputation of DoD HPO research across the scientific community, both military and civilian.

STRATEGIC GOAL 2: Education and Training

*Translate evidence-based science for optimized practical use by a wide array of users through various educational venues and media.*

Compile and translate available evidence-based research on Human Performance Optimization (HPO) and Total Force Fitness (TFF) to provide practical educational materials for optimizing warrior performance to line leadership, healthcare providers, students in the health professions, researchers, warriors, and their families.

**Objectives:**
2.1 Maintain an authoritative, user-friendly website for healthcare providers, warriors, leaders, and their families to provide up-to-date, evidence-based information on HPO, ERE, and TFF.
2.2 Act as primary SMEs for briefings and guidance for and by DoD/MHS and base commands on issues related to HPO and TFF.
2.3 Share findings with and act as SMEs for special-interest groups, including wounded-warrior and VA programs on issues related to HPO and TFF.

**STRATEGIC GOAL 3: Leadership**

*Build and support diverse, holistic teams for research and clinical consultation.*

Provide staff for sound, evidence-based services in Global Health Engagement (GHE) in support of the health, performance, and resilience of uniformed service members and their families.

**Objectives:**

3.1 Build and sustain diverse, holistic HPO research teams within the DoD community of practice.

3.2 Serve as a proactive resource and clinical subject-matter expert (SME) for DoD agencies to assist healthcare providers with consultations on HPO and return-to-duty issues.

3.3 Coordinate medical visits DoD-wide for warriors in need of collaborative secondary, expert evaluation of complex exertional rhabdomyolysis, heat stroke, SCT, and other ERE conditions.

3.4 Assist DoD with emerging policies by providing sound, evidence-based information, contributing to DODIs and CPGs as they are developed and updated. Likewise, serve as SMEs in the development of MHS policy recommendations on HPO issues including but not limited to heat illness, extreme exercise, exercise intolerance, dietary supplements, exertional rhabdomyolysis, musculoskeletal injury prevention, and sickle-cell trait.

3.5 Serve as DoD’s lead for evaluating and integrating key HPO issues and recommending evidence-based policy by hosting consensus workshops, task forces and the like to improve the health and well-being of warriors and their families.

**STRATEGIC GOAL 4: Clinical and Consultative Services**

*Prepare and respond to requests from DoD and other U.S. federal agencies and organizations for clinical and consultative services.*

**Short-Term Objectives:**

4.1 Improve and expand CHAMP’s clinical consultations.

4.2 Provide consultative services to MHS and other networks of clinics and hospitals worldwide, and above all serve the individuals, units, and leaders that comprise our uniformed services.
4.3 Develop, design, and deliver HPO curriculum, lectures, and training opportunities to all DoD requests and participate in HPO global teaching activities within and across the medical and operational communities;

4.4 Contribute to the development of Clinical Practice Guidelines within MHS and for civilian healthcare specialties covering HPO, ERE, nutrition, and other HPO topics.

Medium-Term Objectives

4.5 Reduce MHS clinical load in cases presenting with heat illness, extreme exercise, exercise intolerance, dietary supplements, exertional rhabdomyolysis, musculoskeletal resilience, pain management, and sickle-cell trait through preventive and educational strategies.

Long-Term Objectives

4.6 Establish sound promotion potential to recruit, retain, and encourage rising investigators who can continue the work of current key investigators and staff.

4.7 Develop and maintain collaborations that include ongoing relationships, MOUs, and partnerships with DoD components, academic institutions, and private organizations.

STRATEGIC GOAL 5: Global Health Engagement (GHE)

Participate with USUHS and other centers to ensure GHE policies and practices are informed by evidence-based HPO principles to enhance global resilience and health.

Participate with USUHS and other centers to ensure GHE policies and practices are informed by evidence-based HPO principles that enhance global resilience and health.

Objectives:

5.1 Improve and expand CHAMP’s GHE outreach.

5.2 Provide consultative services to MHS and other GHE networks to ensure individuals, units, and leaders have access to CHAMP’s services.

5.3 Develop, design, and deliver HPO curriculum, lectures, and training opportunities in support of HPO/TFF for all GHE requests.
IV Key Themes And Messages

CHAMP’s key themes and messages all derive from the strategic themes of its BSC. Because the BSC’s conceptual framework is aligned with both MHS and USUHS objectives, it allows us to ensure that we adhere to our overall mission as well as stay on message. CHAMP’s four key themes are:

• Creating new knowledge for human applications
• Translating evidence-based science
• Optimizing communications and knowledge management
• Building and valuing diverse teams

Our specific themes and messages emerge as we apply the ways and means of our BSC in designing and executing our various programs and projects. Our two ultimate ends are always:

• Creating an integrated, world-class HPO community of practice within DoD
• Serving within that community as a trusted resource for TFF and HPO expertise

In accordance with the paradigm shift that gave birth to CHAMP’s first programs, we strive to discover, translate, and disseminate the best available holistic, integrated, evidence-based information to a full range of interested end users, including other researchers and Centers of Excellence as well as Service members and their families, units, healthcare practitioners, and line officers. As the list below demonstrates, we are committed to building effective partnerships and ensuring appropriate, effective practical outcomes.

Educational Activities: Selected Examples

Human Performance Resource Center (HPRC) Website

Provided content, written and multimedia, for the HPRC online resource to contribute education and enhance readiness for Service members, family members, MHS healthcare providers, and DoD leaders. Table 1 (Section VI: Other Information) provides a sampling of the hundreds of educational resources that have been made available on the HPRC website.

Operation Supplement Safety (OPSS)

Made considerable strides as lead in this joint effort between DoD and HPRC to educate Service members, families, DoD leaders, and civilians on dietary supplements and how to use them wisely. Examples of materials published include an OPSS monthly newsletter, OPSS Apps, DS alerts and announcements, High-Risk Supplement List, and approaches for reporting adverse events.
**Warrior Games**

Supported two programs for the Warrior Games: 1) Health Fair for Service members; and 2) Wounded Ill and Injured athletes, where CHAMP provided educational materials and information at a performance nutrition table.

**Rehab, Refit, Return to Duty (Rx3)**

Provided educational materials and supported webinars to help Service members recover from and prevent common musculoskeletal injuries, ultimately improving their overall physical fitness.

**Military Medicine – AMSUS**

Provided oversight of submitting, reviewing, and editing manuscripts in support of the Women in Combat supplement to the *Military Medicine Magazine*.

**Go For Green®**

Provided management of a joint work group to establish this nutrition education program in DoD dining facilities/galleys. Completed posters, information cards, and implementation guidance and partnered with the Army’s Office of the Surgeon General to assist in instituting the program at five Performance Triad pilot sites.

**Marine Corps University**

Provided training to approximately 250 students attending the Command and Staff College as part of their Executive Medicine block of instruction. Provided briefings on nutrition, fitness, and sleep over a two-day period.

**Soldier Fueling Initiative**

Assisted in preparing a manuscript addressing research on Soldiers’ understanding of nutrition labeling and ability to make healthier food choices.

**Master Fitness Training Course (MFTC)**

Supported the Army’s MFTC by providing a nutrition education block of instruction at the two-week didactic portion of the course held at USUHS.

**Combat Rations Database (ComRaD)**

Helped develop and hosted this tool that supports readiness by offering up-to-date nutrition information on military combat rations, including Meal, Ready-to-Eat (MRE), First Strike Ration® (FSR), and Cold Weather/Long Range Patrol (MCW/LRP). Service members, dietitians, food-service officers, and leaders can look up the complete combat ration meals, as well as their individual food components, and obtain information about calories, fat, vitamins, and minerals.

**Ask the Expert (ATE)**

Enhanced education on human performance optimization and readiness by researching and
providing individual responses to over 800 ATEs sent to CHAMP through its HPRC website. Table 2 (Section VI) presents a breakdown of our FY15 ATEs by service/organization and months.

**Operation Live Well (OLW)**

Supported and provided subject-matter expertise and counsel on developing the OLW strategic plan. Assisted in site visits and interviews to help collect information to support a report to Congress.

**ArmyFit/Global Assessment Tool (GAT)**

Researched and provided material for the Army’s GAT to offer affirming responses to individuals taking the GAT. Material provided addressed the areas of marital satisfaction, family satisfaction, loneliness, organizational trust, coping, depression, and others.

**SOCOM**

Supported the SOCOM website development initiative by reviewing and cataloging content on the HPRC website for potential repurposing on the SOCOM site as well as supporting multimedia efforts for the site.

**Additional and Emerging Partnerships**

- Met with the communication director at Warrior Care Policy to discuss collaboration, which led to HPRC articles on Wounded Ill and Injured athletes and the Warrior Games.
- Successfully partnered with the Army National Guard to feature HPRC and Guard Your Health on both websites.
- Met with Vision Center of Excellence and Hearing Center of Excellence to explore opportunities for collaboration.

**RESEARCH ACTIVITIES: Selected Examples**

CHAMP has many ongoing research efforts, so only a few will be highlighted here. See Section VI: Other Information for the full complement of FY15 and FY16 project titles (Tables 3 and 4) and citations for peer-reviewed publications and book chapters that CHAMP has published this FY (Table 5).

**Epidemiology and Genomics of Exertion-Related Events associated with Sickle Cell Trait**

The issue of SCT has been discussed above, but as noted before, our main goal is to contribute to the scientific evidence required for the development of evidence-based policy so our service members are not singled out or discriminated against based on insufficient science. We are excited about this important research project.
**USA Comprehensive Soldier Fitness (CSF)**

Physical and nutritional resilience metrics. Our CSF study will be very important to all Services because it will provide benchmarks for nutritional status and performance as well as psychosocial parameters. This is an ongoing study that should be completed within the next year.

**Human-Dog Interactions**

Neuroendocrine and physiological alterations in service members with PTSD who train service dogs. This is the second year of our effort to determine whether having a Service member train a service dog might become an evidence-based therapy for PTSD. We hope to complete the study over the coming year.

**CLINICAL ACTIVITIES: Selected Examples**

CHAMP has chosen to focus on certain clinical efforts, primarily related to ERA (exertion-related events). In particular, our heat tolerance testing, our SCT protocol, and our exertional rhabdomyolysis (ER) efforts are key. SCT was the only one funded, but in FY16 we have funding for ER and exercise intolerance.

**Heat Tolerance Testing for Exertional Heat Illness**

Our heat tolerance testing protocol is currently unfunded, but we continue to test Service members who have experienced an exertional heat stroke. We tested three this year and returned them all to duty. Our hope is that this work will be translated into policy and be used for Return To Duty purposes.

**Recurrent Exertional Rhabdomyolysis (ER)**

As noted in our performance measures, we are the lead in complex cases of ER. Over the past year we saw a number of interesting cases, for which we have a team to examine clinical, histopathological, and genetic information on complex patients. Many of the patients are very interesting, but one patient with a history of recurrent ER was found to have a mutation in the Dynamin 2 (DNM2) gene. Mutations in the DNM2 are known to cause various neuromuscular disorders. This finding is just one example of about 10 this year that show heterogeneity of genetic risk factors linked to complex ER. This work has also expanded the phenotypic spectrum of DNM2-associated neuromuscular disorders.

**Androgens, Anabolic Steroids, and Related Substances: What We Know and What We Need to Know Symposium**

On 28 and 29 April 2015 CHAMP convened a symposium to define the relevant issues related to androgen and anabolic steroid use in the SOF community. Representatives from all SOCOM Component Commands attended with the goal of developing a framework for how to address the identified issues in the future. Working groups defined the way ahead in
terms of AAS use, education, research, relevant policies and guidelines, and other concerns relevant not only to SOF, but the entire DoD enterprise. The SOCOM CPG for prescribing testosterone was discussed.

**Musculoskeletal Education for Providers**

Over the past year CHAMP has developed a variety of tools for primary-care physicians to treat patients with common musculoskeletal injuries. Part of this project, entitled “Rehab, Refit, Return to Duty,” or Rx3, has included webinars on the following topics: 1) Knee Pain, 2) Hip Pain, 3) Lower Back Pain, 4) Ankle Sprain Pain, and 5) Heel Pain. These seminars can be found at http://hprc-online.org/physical-fitness/rehab/for-the-provider.

**Contributions to Policies**

CHAMP continues to serve DoD as a subject-matter expert, contributing to various policies within MHS, to include charters, DoDIs, and similar documents. In FY15, CHAMP contributed to the revision of DoDI 6465.01—“Erythrocyte Glucose-6-Phosphate Dehydrogenase Deficiency (G6PD) and Sickle Cell Trait Screening Programs—issued on 1 July 2015. As noted elsewhere, CHAMP has been involved in developing the evidence base for such policy.

CHAMP has also contributed to the development of a draft DoDI 6130.xx—Dietary Supplements: Promoting Safe Use for DoD Military, Civilian and Contracted Personnel. This draft DoDI is currently being staffed for review and comments.

Other contributions include the drafting of a new charter for the DoD Nutrition Committee, which was signed on 21 September 2015 by Dr. Jonathan Woodson. Lastly, CHAMP contributed to revision and review of the USASOC Androgen Deficiency Clinical Practice Guideline, which will be adopted by USSOCOM when finalized.
V Performance Highlights of FY2015

CHAMP’s strategic framework through its BSC has outlined a set of clearly defined metrics in support of our mission and vision. The summary outline of 2015 accomplishments displays the extent to which CHAMP has achieved those goals over the past year.

**Partners and Collaborators**
- Over 9 Memorandums of Understanding (MOU)
- More than 80 collaborators/partners (5 new MOU this year)

**Customer Satisfaction**
- At least 82% satisfied with Ask The Expert (ATE) responses as assessed by email survey

**Outreach Activities**
- Over 25 invited seminars/presentations at national and international meetings/workshops. For example:
  - Keynote and several presentations at the 2014 Special Operations Medical Association Conference
  - Presentation at the National Security Agency
  - Presentation at the All-Academy Physical Education & Human Performance Symposium
  - Talk at the 2015 NFL Combine
  - Presentation at the Israeli Defense Force Shoresh Conference on Military Medicine
  - Presentation at the DoD Precision Medicine Symposium
- Hosted multiple onsite and offsite events, e.g.:
  - Sports Medicine Workshop: Hands-On Demonstration of the New DoD Musculoskeletal Injury Mitigation Program
  - The Androgen and Androgen Precursors Workshop
- Multiple lectures, panel discussions, and webinars in a variety of venues

**Clinical Consults**
- 5 exertion-related heat event consults and 15 other exertion-related events
  - Resulted in saving $790,000 through heat-tolerance testing and returning service members to duty

**Scientific Products**
- Peer-reviewed publications (46), book chapters (4), and abstracts (>18)
- Scientific recognition: ∼4,416 papers cited and 23,000 papers viewed by other scientists

**Educational Website Highlights**
- Saw a 124% increase in HPRC traffic from FY14
- Noted a 142% increase in OPSS traffic from FY14
- Responded to 804 ATEs
- Prepared 198 BLUFs and 36 FAQs

## VI Other Information

A series of tables follow that provide details of CHAMP’s output, generally by program, to flesh out the descriptions in the main narrative of this report. Where a complete list would be excessively long, a representative sample is provided instead.

<table>
<thead>
<tr>
<th>TABLE 1. Selected BLUFs from CHAMP’s HPRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does “helicopter parenting” work?</td>
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<td>Products claiming to prevent or treat Ebola</td>
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<td>Messed up? Own it.</td>
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<td>“Winter is coming...”</td>
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<td>Safe return to duty after a head injury</td>
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<td>Weight-loss promises</td>
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<td>Make no bones about it: Get enough magnesium!</td>
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<td>Don’t let good times turn deadly</td>
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<td>Eat smart for a healthy heart</td>
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<td>Just beet it!</td>
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<td>Truth in advertising?</td>
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<td>Do you believe in love?</td>
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<td>Set the fitness example for your kids</td>
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<td>Help stop bullying</td>
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<td>Will nootropics help my brain?</td>
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<td>Learn how to stretch mindfully</td>
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<td>Warm up and calm down with a jingle</td>
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<td>Have a (chocolate) heart</td>
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<td>Go Red for Women</td>
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<td>Lucky number 7? Omega-7s and your health</td>
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<td>Mindfulness meditation: a primer</td>
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<td>For better relationships, cool it!</td>
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<td>National Nutrition Month 2015</td>
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<td>Spring forward, but don’t miss out on sleep!</td>
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<td>Check out Performance Triad’s new materials</td>
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<td>Can supplements boost your T?</td>
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<td>Is perfectionism the perfect way to train?</td>
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<td>New ComRaD tool exposes rations’ nutrition</td>
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<td>Make orange your main squeeze</td>
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<td>White out for good health</td>
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<td>Is your Achilles tendon an uphill battle?</td>
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<td>National Veterans Summer Sports Clinic</td>
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<td>Families that play together, stay together</td>
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<td>What is bitter orange?</td>
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<td>Apps and more for military kids</td>
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<td>The power of purple produce</td>
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<td>Think pink for lycopene</td>
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<td>Listen to your heart</td>
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<td>Spring cleaning—a mindful approach</td>
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<td>Hemp products: Are they allowed?</td>
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<td>Avoiding grains? Think again.</td>
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<td>National Veterans Wheelchair Games</td>
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</table>
TABLE 1. Selected BLUFs from CHAMP’s HPRC

<table>
<thead>
<tr>
<th>Can you spice up your weight loss?</th>
<th>Are you tough enough...mentally?</th>
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<tbody>
<tr>
<td>High-intensity exercise for your teen</td>
<td>“Tainted” dietary supplement products</td>
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<tr>
<td>Stressed out? It isn’t all in your head.</td>
<td>Get into the Zone</td>
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<td>Nitric oxide supplements for performance?</td>
<td>What’s cooking? Food safety for summer</td>
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<td>Fueling for performance</td>
<td>DMAA is still around</td>
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<td>Free summer meals for kids</td>
<td>How much protein?</td>
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<td>Cannabidiol in dietary supplements</td>
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<td>Cope with emotions through mindfulness</td>
<td>Make your meals a veggie victory</td>
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<td>Caring for your aging parents</td>
<td>Tips for caregivers</td>
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<td>What’s in your energy drink?</td>
<td>Countdown to end childhood obesity</td>
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<td>Recovery Care Coordinators can help!</td>
<td>Products claiming to prevent or treat Ebola</td>
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<td>Help kids limit screen time</td>
<td>Messed up? Own it.</td>
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<tr>
<td>Don’t get “computer eyes”</td>
<td>Weight-loss promises</td>
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<td>30-second breaks help your body!</td>
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<td>Postpartum exercise</td>
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<td>Dealing with frequent separations</td>
<td>Eat smart for a healthy heart</td>
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<td>Fuel your adolescent athlete</td>
<td>Healthy eating for healthy joints</td>
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<td>Products for concussions hit by FDA</td>
<td>Truth in advertising?</td>
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<td>Moms-to-be: Exercise for a healthier birth</td>
<td>FDA warns again about powdered caffeine</td>
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<td>Find your Target Heart Rate</td>
<td>“Winter is coming...”</td>
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<td>What exactly is a “trigger point”?</td>
<td>Breathe better, run better!</td>
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<td>Protein powders: Food or supplements?</td>
<td>Eat whole grains your way</td>
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<td>Breathe easy: summer outdoor exercise safety</td>
<td>How to eat for better sleep</td>
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<td>Stress can zap your relationships</td>
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<td>Snacking for success</td>
<td>Tunes and training</td>
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<td>Where to go for dietary supplement information</td>
<td>Supplements and medications - What’s the problem?</td>
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### TABLE 1. Selected BLUFs from CHAMP’s HPRC

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<thead>
<tr>
<th>BLUF</th>
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<td>Refuel, rehydrate, recover</td>
<td>Energy drinks and teens don’t mix</td>
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<td>Noise pollution and hearing loss</td>
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<td>Help your children’s oral health</td>
<td>A “natural” way to recover</td>
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<td>Make no bones about it: Get enough magnesium!</td>
<td>Tattoos in uniform</td>
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### TABLE 2. A Quantitative Summary of Ask The Expert questions submitted to HPRC

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<td>Nat’t Guard Air</td>
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</table>
**TABLE 3. Research and Education Efforts by Program, Project, or Laboratory (FY15 and ongoing)**

**Human Performance Laboratory**
- Exertional Heat Illness: Biomarkers for prediction and return to duty
- Heat Tolerance Testing for Exertional Heat Illness
- Comprehensive Soldier Fitness: Physical and nutritional resilience metrics. U.S. Army
- Human-dog interactions: Neuroendocrine and physiological alterations in service members with PTSD who train service dogs.
- Epidemiology and Genomics of Exertion-Related Events associated with Sickle Cell Trait

**Injury Research Prevention Laboratory**
- MEPSTART: Predicting and preventing musculoskeletal injury in new enlistees at Military Entrance Processing
- CORE: Evaluating functional movement changes in Marines across deployment: Combat Readiness Evaluation

**Applied Physiology Laboratory**
- Biomarkers of heat intolerance in mice
- Breeding colonies for susceptibility in heat and high-fat diet (mice)
- Center Alliance for Nutrition and Dietary Supplements
- High-fat diet in obese mice
- Evaluation of behavioral and physiological changes in mice fed a high-fat diet
- Evaluation of calcium and vitamin D supplementation for optimizing bone health during Marine Corps training
- Effects of heat and strenuous activity on oral microbiome and blood homeostasis
- The role of the omega-6:omega-3 fatty acids in behavioral alterations in mice fed a high-fat diet
- Physiological and molecular Influences of Astaxanthin supplementation in heat stress
- Micronutrients and suicide
- Adverse Event Reporting for dietary supplements by healthcare providers
**Education**

- Operation Supplement Safety
- Human Performance Resource Center
- Go For Green®
- Rehab, Refit, Return to Duty (Rx3)
  - Knee Pain Rehab Webinar
  - Hip Pain Rehab Webinar
  - Lower Back Pain Webinar
  - Ankle Sprain Pain Rehab Webinar
  - Heel Pain Webinar
- Building resilience among SOF families
- Operation Live Well: Strategic planning for the future
- Combat Rations Database (ComRaD)

**TABLE 4. Research and Education Efforts by Program or Laboratory (New in FY16)**

**Applied Physiology Laboratory**
- In Vitro Studies of Dietary Supplements for Enhancement of Muscle Cell Heat Tolerance
- Application of low-dose inhaled carbon monoxide to attenuate diet-induced obesity and insulin resistance in rats

**Center Alliance for Nutrition and Dietary Supplements**
- In vitro studies of dietary supplementation for enhancement of muscle-cell heat tolerance
- Cognition and memory loss in rats – Impact of various diets: Ketones, low carbohydrates, and low fat
- Performance-enhancing supplement use by Special Operations Forces
- Effects of Health Cooking on Food Choice Behaviors, Nutrition Status, and Psychological State in Wounded Warriors and Their Families
- A pilot study of androgen-use prevalence in Special Operations Forces
- Development of neuroprotection strategies for brain injury in a rat model

**Human Performance Laboratory**
- Sickle-cell trait: Ethnic, physiologic, and genetic variability to exertion
• Green Road: Nature as a source of stress reduction

• Exercise stress testing in exertional heat illness/rhabdomyolysis: Clinical utility and biomarkers for prediction

• EHI and neurocognition

• Validation of CHAMP VO2max treadmill test and modified Queen’s College step as a measure of cardiorespiratory fitness

• Development and validation of a measure of spiritual performance

• Soldier Medic Mettle Study: Secondary Data Analysis

• Secondary Analysis of Health-Related Behaviors Survey of Active-Duty Military Personnel

Injury Research Prevention Laboratory

• Reducing Injuries with Training Enhancement, Targeted Rehabilitation, and Core Conditioning

Women in Combat Studies

• Physiological impact of female warrior training

• Female warriors: longitudinal evaluation of factors predicting career success

• Predictors of success in females attending selection/training courses previously closed to women

Education

• STRONG B.A.N.D.S. (Balance, Activity, Nutrition, Determination, and Strength)

• Operation Supplement Safety (OPSS)

• Human Performance Resource Center (HPRC)

• Rehab, Refit, Return to Duty (Rx3)

• Building resilience among SOF families
### TABLE 5. Peer-Reviewed Publications and Book Chapters from CHAMP in FY15

<table>
<thead>
<tr>
<th>Peer-Reviewed Publications</th>
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**Book Chapters**

