TABLE OF CONTENTS

Symposia Session Chairs 1
Changes to Speakers 3
Reassigned Poster 5
Changes to Posters 5
Late Poster Submissions 5
Posters Withdrawn from Poster Sessions 6
Accreditation Information 7
Activity Schedule 13
Abstracts 15

SYMPOSIA SESSION CHAIRS

Tuesday, September 1, 2009

2:15 PM - 4:15 PM Concurrent Sessions of Podium Presentations I

Symposium 1: Assessment Tools
- Dr. Melissa Forsythe, Congressionally Directed Medical Research Programs (CDMRP)

Symposium 2: Biomarkers I
- Maj David Watson, Clinical Investigation Facility, Travis Air Force Base

Symposium 3: Stress and Fear
- COL Carl Castro, U.S. Army Medical Research and Materiel Command (USAMRMC)

Symposium 4: Resuscitation
- COL Dallas Hack, USAMRMC

Symposium 5: Molecular Pathobiology I
- Dr. Steven Kaminsky, Uniformed Services University of the Health Sciences (USUHS)

4:30 PM - 6:30 PM Concurrent Sessions of Podium Presentations II

Symposium 6: Telemedicine
- COL Karl Friedl, Telemedicine and Advanced Technology Research Center (TATRC)

Symposium 7: PTSD Treatment I
- CAPT William Tanner, Wounded Warrior Regiment

Symposium 8: Epidemiology
- COL Janet Harris, USAMRMC

Symposium 9: Molecular Processes of Treatment
- CAPT Mark Olesen, Headquarters, United States Marine Corps

Symposium 10: Neuroprotection I
- Dr. James Phillips, CDMRP

Wednesday, September 2, 2009

2:30 PM - 3:45 PM Concurrent Sessions of Podium Presentations III

Symposium 11: Sleep
- Dr. Holly Campbell-Rosen, CDMRP

Symposium 12: Wound Healing
- COL Jonathan Jaffin, Office of the Surgeon General of the Army

Symposium 13: Tropical Diseases
- Dr. James Phillips, CDMRP

Symposium 14: Virtual Reality
- Dr. Steven Kaminsky, USUHS

Symposium 15: Pain
- Dr. Melissa Forsythe, CDMRP

Symposium 16: Inflammation
- LtCol Donnamaria Jones, Office of the Surgeon General of the Air Force

Symposium 17: Blast Injury Sequelae I
- Dr. J. Frazier Glenn, USAMRMC

Symposium 18: Regenerative Medicine
- COL Janet Harris, USAMRMC

Symposium 19: Physical Rehabilitation
- CAPT William Tanner, Wounded Warrior Regiment

Symposium 20: Resilience
- COL Richard Ricciardi; Defense Centers of Excellence for PH and TBI

Thursday, September 3, 2009

8:15 AM - 10:15 AM Concurrent Sessions of Podium Presentations V

Symposium 21: Quality of Life and Family Issues
- Dr. Allison Milutinovich, CDMRP

Symposium 22: Neuroprotection II
- COL Jonathan Jaffin, Office of the Surgeon General of the Army

Symposium 23: Neurobiology
- Dr. J. Frazier Glenn, USAMRMC

Symposium 24: Imaging
- Mr. Michael Leggieri, USAMRMC

Symposium 25: Biomarkers II
- Maj David Watson; Clinical Investigation Facility, Travis Air Force Base

10:30 AM - 12:30 PM Concurrent Sessions of Podium Presentations VI

Symposium 26: Substance Abuse
- CDR Laura Draski, Department of Health and Human Services

Symposium 27: Molecular Pathobiology II
- LtCol Donnamaria Jones, Office of the Surgeon General of the Air Force

Symposium 28: PTSD Treatment II
- Dr. Holly Campbell-Rosen, CDMRP

Symposium 29: Blast Injury Sequelae II
- Dr. Barbara Terry-Koroma, CDMRP

CHANGES TO SPEAKERS

Tuesday, September 1, 2009

Plenary Session - The New Face of War

- Ms. Ellen Embrey's name was misspelled in the program book. The program and editorial staff apologize for the error.
- The Moment of Silence will be given by LCDR Kim Sablan, U.S. Navy
- LTC Benjamin Clark (Director of the Army Family Advocacy Program, Family and Morale, Welfare and Recreation Command) will be presenting for Dr. Lynn McCollum.

Symposium 2 – Biomarkers I

- Stanislav Svetlav will not be presenting. Instead, Kevin Wang will present "Comprehensive Experimental Models for Profiling Mechanisms and Developing Biomarkers of Blast Brain Injury."

Symposium 6 - Telemedicine

- Ron Acierno will not be presenting. Instead, Marty Strachan will be presenting "Innovative Service Delivery for Secondary Prevention of PTSD in At-Risk OIF-OEF Service Men and Women."
- Gregory Gahm will not be presenting. Instead, Greg Reger will be presenting "Update on Novel Treatment Studies by the National Center for Telehealth & Technology in the InTRUST Consortium."

Symposium 7 - PTSD Treatment I

- Edna Foa will not be presenting. Instead, Elizabeth Hembree will be presenting "Prolonged Exposure Therapy for PTSD Among OIF/OEF Personnel: Weekly Session vs. Daily."

Symposium 9 - Molecular Processes of Treatment

- Larry Kwak will not be presenting. Instead, Hong Qin will be presenting "Snake Venom Extract Induces Sterile Inflammation and Potent Vaccine-Triggered Adaptive Immunity."

Wednesday, September 2, 2009

Morning Session - Caregivers

- Dr. Stacey Young-McCaughan will be moderating the session in the place of COL Kathryn Gaylord.

Morning Session - Challenges in Chronic Pain Management

- Dr. Daniel Clauw will present "Mechanisms and Treatment of Chronic Pain: Lesson Learned from Fibromyalgia and Related Conditions." (See abstract on page 15.)
- CDR James Houston will present "Chronic Pain, Addiction, and Alternative Therapies." (See abstract on page 16.)

Plenary Session - Tomorrow's Medicine

- Dr. Amishi Jha will present "Improving Attention and Working Memory with Mindfulness Training." (See abstract on page 17.)
- Dr. Greg Downing will speak about "The Emerging Pathways to Personalized Health Care." (See abstract on page 18.)

Symposium 13 - Tropical Diseases

- Choukri Ben Mamoun will not be presenting.

Symposium 14 - Virtual Reality

- Gregory Gahm will not be presenting. Instead, Greg Reger will be presenting "Comparing Virtual Reality Exposure Therapy to Prolonged Exposure in the Treatment of Soldiers with Post-Traumatic Stress Disorder."

Symposium 15 - Pain

- John Childs will not be presenting.
- Wayne Jonas will not be presenting. Instead, Alexandra York will be presenting "Acupuncture for the Treatment of Trauma-Induced Spectrum Disorder: A Three-Armed Randomized Pilot Study."
- Robert Gatchel will not be presenting. Instead, Alan Peterson will be presenting a new abstract: "A Randomized Trial of Musculoskeletal Pain Treatment in a Military Population: A Preliminary Study Leading to the STRONGSTAR Investigation."

Symposium 19 - Physical Rehabilitation

- Ross Zafonte will not be presenting. Instead, Paolo Bonato will be presenting "Combining tDCS and Robotic Training in TBI Survivors."

Thursday, September 3, 2009

Morning Session – Problem Solving for Prosthetic Development

- Dr. Jeffrey Morgan will be speaking in this session. (See abstract on page 19.)

Morning Session – Problems and Prospects in Wound Management

- In addition to Dr. O'May, LTC Robert Gerhardt will present "Combat Wound Care: State-of-the-Art and Beyond."

Symposium 21 - Quality of Life and Family Issues

- Murray Stein will not be presenting. Instead, Raul Coimbra will be presenting "The Assessment Core of the South Texas Research Organizational network Guiding Studies on Trauma and Resilience (STRONG STAR)."
- James Gordon will not be presenting. Instead, Julie Staples will be presenting "A Randomized Controlled Study of Mind-Body Skills Groups for Treatment of War-Zone Stress in Military and Veteran Populations."

Symposium 22 - Neuroprotection II

- M. Bullock Ross will be the presenter for P22-2.
- Irshad Chaudry will not be presenting. Instead, William Hubbard will be presenting "Neuroprotection by Estrogen Following Traumatic Brain Injury."

Symposium 25 - Biomarkers II

- Li-Xia Yang will not be presenting. Instead, Zhiqun Zhang will be presenting "Detection and Verification of Two Targeted Traumatic Brain Injury Biomarkers in Circulating Biofluids as Well as Brain Tissue in a Rat Model of Penetrating Ballistic-Like Brain Injury."

Symposium 26 - Substance Abuse

- Mark Sobell will not be presenting. Instead, Alan Peterson will be presenting "Smoking Cessation: Minimizing Weight Gain and Preventing Relapse by Reducing Alcohol Consumption."

Symposium 27 - Molecular Pathobiology II

- Jesse Roman will not be presenting. Instead, Jeffrey Ritzenthaler will be presenting "Role of Nicotinic Acetylcholine Receptors in Lung Development: Implications for Airways Disease in Adults."
- Rachel Yehuda will not be presenting. Instead, Julie Golier will be presenting "Molecular Mechanisms Underlying Individual Differences in Response to Stress in a Previously Validated Animal Model of PTSD."

REASSIGNED POSTER

From P31-7 to P17-9 Cognitive Processing Therapy for Combat-Related Post-Traumatic Stress Disorder *(Patricia Resick, presenter)*

CHANGES TO POSTERS

P15-11 Strong Families Strong Forces: Preliminary Findings in the Development of a Family-Based Reintegration Program Supporting Military Families with Very Young Children. *The authors for this abstract and poster are Betsy McAlister Groves,*[1] *Ellen DeVoe,*[2] *Ruth Paris,*[2] *and Abby Ross*[2] (*[1]Boston Medical Center and [2]Boston University Charles River Campus*)

P21-5 Innovative Service Delivery for Secondary Prevention of PTSD in At-Risk OIF-OEF Service Men and Women. *Marty Strachan will be presenting for Ronald Acierno.*

P32-6 Monitoring for Seizures After Traumatic Brain Injury. *Maria Etchepare will be presenting for Paul Vespa.*

P36-2 Combining tDCS and Robotic Training in TBI Survivors. *Paolo Bonato will be presenting for Ross Zafonte.*

LATE POSTER SUBMISSIONS

P10-1 Assessment of Acute Mild Traumatic Brain Injury by Quantitative EEG Analysis. (See abstract on page 20.) Eli Mizrahi,[1] James D. Frost, Jr.,[1] David E. Friedman,[1] Richard A. Hrachovy,[1] and Jeremy D. Slater.[2] (*[1]Baylor College of Medicine and [2]University of Texas Medical School at Houston)*

P16-5 Eye-Tracking Rapid Attention Computation Prototype Development for Mild Traumatic Brain Injury. (See abstract on page 21.) *Shon Darcy,*[1] *Jun Maruta,*[2] *Jamshid Ghajar,*[2] *and Timothy Harrigan*[1] (*[1]Foster-Miller, Inc. and [2]Brain Trauma Foundation, Inc.*)

P18-17 Developing a Social Support Intervention for Young Military Personnel. (See abstract on page 22.) *Juliet Vogel, Karen Pelcovitz, Courtney Suss, Victor Labruna, and Sandra Kaplan (Division of Trauma Psychiatry, North Shore Hospital, Manhasset, New York)*

P34-1 A Randomized Trial of Musculoskeletal Pain Treatment in a Military Population: A Preliminary Study Leading to the STRONGSTAR Investigation. (See abstract on page 23.) *Alan Peterson,*[1] *Donald McGeary,*[2] *Mysti Moore,*[3] *and Robert J. Gatchel*[3]

([1]*University of Texas Health Science Center at San Antonio,* [2]*Wilford Hall Medical Center, and* [3]*University of Texas at Arlington*)

POSTERS WITHDRAWN FROM POSTER SESSIONS

P1-1 Effects of Sit-Up Training vs. Core Stabilization Exercises on Sit-Up Performance, *John Childs*

P1-8 A Randomized Controlled Trial of Medical Therapies for Chronic Post-Traumatic Headaches, *Jay Erickson*

P3-2 Dissecting the Actions of Alcohol Metabolites Mediating Pathologic Exocytosis That Underlie Alcoholic Pancreatitis, *Subbulak Chidambaram*

P5-5 Validation of the SPECT Ligand CLINDE as a Marker of Microglial Activation in Baboons, *Jonas Hannestad*

P9-1 The Antimalarial Drug Amodiaquine Inhibits the *Plasmodium falciparum* Phosphoethanolamine Methyltransferase, *Choukri Ben Mamoun*

P18-2 INjury and TRaumatic Stress (INTRuST) Consortium: From Inspiration to Implementation, *Murray Stein*

Accreditation Information

Sponsor Information

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Purpose Statement

These evidence-based symposia are designed to highlight new research over diverse disciplines in the field of military health research and expedite the transition of the research products into clinical and field applications.

Target Audience

The target audience includes military and civilian physicians, scientists, nurses, and other health care professionals (national and international) funded through the Congressionally Directed Medical Research Programs (CDMRP) military relevant programs, government and military policy makers, and consumer advocates. Knowledge level will be at or above a postgraduate level. No prerequisites are required of participants.

Learning Objectives

- Demonstrate a clear understanding of the latest research findings in all areas of military health research and how these findings will impact future decision making in the treatment of service men and servicewomen and their dependents.
- Translate how the integration of information from the basic, translational, and clinical sciences impacts the development of new clinical and field applications for treating the effects of war.
- Integrate the use of new technologies to more accurately diagnose and better treat diseases and battle-related disorders.
- Formulate new strategies and forge collaborations that will expedite the transition of research products into clinical and field applications.

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August 31–September 3, 2009

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- Cortical Metrics noninvasive neurodiagnostic device *(Dennis)*
- MagnaFix magnetic pulse device for veterinary use to accelerate musculoskeletal tissue healing *(Dennis)*
- Recombinant Factor VII for traumatic bleeding *(Edgar)*
- Near-infrared laparoscope for laparoscopy *(Seiden)*
- ProSense Molecular Imaging Agent Indocyanine Green for optical imaging *(Seiden)*

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ACTIVITY SCHEDULE

Tuesday, September 1, 2009

7:00 – 8:00 AM	**MORNING SESSIONS**	
	Complementary and Alternative Medicine Dr. John Glowa and Ms. Joan Walter	*Hyatt New York A*
	Therapeutic Applications of Virtual Reality Dr. Greg Reger and Dr. Jason Wilken	*Hyatt Chicago A*
	What Is Gulf War Illness and What Caused It? A Discussion of the Evidence Dr. Lea Steele, COL Charles Engel, Dr. Roberta White, and Dr. Kelley Brix	*Hyatt Chicago B*
	Advances in Imaging Techniques Dr. Thomas Budinger and Dr. Michael Seiden	*Hyatt Chicago C*
8:15 – 11:30 AM	**PLENARY SESSION: THE NEW FACE OF WAR** *Moderator: Ms. Ellen Embrey* ***The New Face of War: Research Imperatives*** Ms. Ellen Embrey ***Baghdad ER Revisited: The 28th Combat Support Hospital of Operation Iraqi Freedom 2006–2008*** COL Erin Edgar ***Prosthetic Rehabilitation*** CAPT Jonathan Kuniholm ***The Impact of War on the Reserve Components*** BG Margaret Wilmoth ***Impact of War on Soldiers and Families*** LTC Ben Clark	*Westin Century Ballroom C*

Wednesday, September 2, 2009

7:00 – 8:00 AM	**MORNING SESSIONS**	
	Caretakers* Dr. Stacey Young-McCaughan (moderator), Dr. Heidi Kraft, and Ms. Sarah Wade	*Hyatt New York A*
	Eradicating Disease Dr. Joseph Fair	*Hyatt Chicago A*
	Challenges in Chronic Pain Management* Dr. Daniel Clauw	*Hyatt Chicago B*
	Neurogenesis and Depression Dr. Barry Jacobs and Dr. Fritz Henn	*Hyatt Chicago C*

*This presentation is not available for Continuing Education.

8:15 – 11:30 AM	**PLENARY SESSION: TOMORROW'S MEDICINE** *Moderator: Dr. George Weightman* ***Improving Attention and Working Memory with Mindfulness Training*** Dr. Amishi Jha ***Personalized Medicine*** Dr. Gregory Downing ***Musculoskeletal Regenerative Medicine: Bone and Nerve Tissue Engineering*** BG Michael Yaszemski ***Tissue Engineering: Learning from the Past While Looking Toward the Future*** Dr. Robert Dennis ***Prospects for Presymptomatic Diagnosis*** Dr. Stephen Johnston	*Westin Century Ballroom C*

Thursday, September 3, 2009

7:00 – 8:00 AM	**MORNING SESSIONS**	
	Problem Solving for Prosthetic Development Dr. Glenn Klute, Dr. Michael Goldfarb, CAPT Jonathan Kuniholm, and Dr. Jeffrey Morgan	*Hyatt New York A*
	Problems and Prospects in Wound Management LTC Robert Gerhardt and Dr. Graeme O'May	*Hyatt Chicago A*
	Clinical Trials with Military Populations Ms. Annette McClinton	*Hyatt Chicago B*
	Behavioral Therapies Dr. Alexander Prokhorov	*Hyatt Chicago C*

MECHANISMS AND TREATMENT OF CHRONIC PAIN: LESSON LEARNED FROM FIBROMYALGIA AND RELATED CONDITIONS

Daniel J. Clauw, M.D.
Director, Chronic Pain & Fatigue Research Center, The University of Michigan

Fibromyalgia (FM) is the second most common rheumatic disorder, affecting approximately 2%–3% of the population. The 1990 American College of Rheumatology criteria require that individuals have a history of chronic widespread pain and display diffuse tenderness on examination, based on having 11 or greater (or a possible 18) tender points on examination. Alternate diagnostic criteria have been developed that do not require a tender-point exam and instead require both widespread pain and multiple somatic symptoms (e.g. fatigue, memory difficulties, and insomnia).

Considerable research in the past decade has taught us a great deal about fibromyalgia. It is now clear that this is now one of many "central pain" conditions where the pain and other sensory symptoms are not due to damage or inflammation in peripheral tissues but instead in part due to augmented processing of pain and sensory information in the central nervous system (CNS). This phenomenon can be identified using experimental pain testing, functional neuroimaging, and analysis of neurotransmitters in the CNS that are involved in pain and sensory transmission.

Similarly augmented pain processing (also termed hyperalgesia or allodynia) is also identifiable in the majority of individuals with a variety of other chronic pain states, such as irritable bowel syndrome, idiopathic low back pain, temporomandibular disorder, interstitial cystitis, chronic prostatitis, vulvodynia, and endometriosis. These central pain states: (1) occur approximately 1.5–2 times as commonly in females than males; (2) have very strong familial and genetic underpinnings; (3) can be triggered by a variety of different stressors, including infection, as well as physical and emotional trauma, and thus deployment to war appears to be a potent trigger of these conditions; and (4) respond to the same types of pharmacological and nonpharmacological therapies. In fact, even subsets of individuals with "peripheral" pain states such as osteoarthritis will have hyperalgesia/allodynia and respond to treatments commonly used in the setting of FM, rather than peripherally based treatments such as NSAIDs, opioids, or procedures.

The most effective therapy for FM and related conditions is to employ a patient-centric, multimodal approach that combines the use of pharmacological therapies aimed at improving symptoms and nonpharmacological therapies aimed at improving function. The nonpharmacological therapies with the highest level of evidence are education, exercise, and cognitive behavioral therapy. The pharmacological therapies with the highest level of evidence include classes or drugs that raise serotonin and norepinephrine (e.g., tricyclics and dual re-uptake inhibitors) and/or drugs that inhibit the release of excitatory neurotransmitters such as Substance P and glutamate (e.g., pregabalin and gabapentin).

One of the primary lessons learned from the study of FM and related conditions is that "central" pain is extremely common in clinical practice, and practitioners need to better understand this type of pain and modify their peripherally directed (or dualistic) diagnostic and treatment paradigms that assume that pain is either due to inflammation or damage or due to psychological causes.

CHRONIC PAIN, ADDICTION, AND ALTERNATIVE THERAPIES

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Chronic pain is widespread in the military and in the general population, is a leading cause of disability, and greatly impacts quality of life. Traditional treatments with medications, including opioids, frequently leave patients with significant side effects, continued pain, and can lead to addiction and abuse. Comprehensive, multimodal pain treatment plans, including acupuncture and other alternative therapies, can improve pain scores, functional status, and reduce medication usage with associated side effects. Typical applications of acupuncture and cupping for the treatment of lower back pain will be demonstrated.

IMPROVING ATTENTION AND WORKING MEMORY WITH MINDFULNESS TRAINING

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Attention and working memory are central to one's ability to survive and thrive. These mental operations are important for "cold" cognitive operations, such as abstract problem solving and decision making. They are also critical for healthy responses when we are faced with "hot" emotional demands requiring reappraisal and regulation of emotional reactivity. Recent studies suggest that mindfulness training (MT) may bolster mental functioning when "cold" as well as "hot" demands are high. In this presentation, we explore the hypothesis that MT may have such broad salutary effects because of its ability to strengthen core attention and working memory capacities. I will review evidence of neural and behavioral changes that accompany mindfulness training in civilians. In addition, I will share recent work we have conducted in a predeployment military cohort in which mindfulness training appears to have protective effects on both working memory and emotional experience. While MT will not be discussed as a disease-treatment modality, it will be discussed as a promising tool and potential prophylaxis against the damaging and debilitating consequences of high-stress experiences, which can lead to psychological disease and dysfunction.

THE EMERGING PATHWAYS TO PERSONALIZED HEALTH CARE

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This presentation will provide an overview from the federal level on advances in science, technology health care policy that address individualized approaches to patient care management. The confluence of advances in the biological understandings of differences among populations, widely deployed high-throughput medical technologies, and integration of health information systems are driving forces for change in health care. Patients and health care providers are increasingly aware of the opportunities and challenges that will improve the quality of patient-centric health care services to provide personalized, predictive, preemptive, and participatory care.

THE BIG CHALLENGE FOR PROSTHESIS DEVELOPMENT

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Transcutaneous osseointegration is a promising new method of fixing a prosthesis directly to bone: a titanium rod is screwed into the bone of the residual limb and protrudes from the skin, and the exoprothesis is attached to the protruding rod. In true osseointegration, the living bone becomes fused with the oxide layer of the titanium, and this anchorage persists under normal conditions of loading, a true biohybrid approach. Among the benefits claimed for this technique is osseoperception, a term that denotes the ability of patients with osseointegrated devices to identify tactile thresholds through their prostheses, thus improving amputee perception of his or her environment. Several fully internal osseointegrated devices have been described for orthopedic applications. Indeed, titanium joint replacements in use worldwide incorporate osseointegration principles. The application of these principles to amputees, however, has raised concerns because the titanium device is transcutaneous. Thus, the concern is not with the integration of these devices with bone, but rather the concern is focused on the ability of these devices to adequately integrate with the skin. Without a permanent long-lasting seal with the skin, these devices will suffer from the same problems of infection and inflammation that limits the lifetime of the entire family of percutaneous medical devices that penetrate the skin. There are more than a million percutaneous devices (indwelling catheters, dialysis ports, feeding tubes, etc.) put in patients each year. The problems of infection and inflammation severely limit the indwell time and thus the usefulness of the entire family of percutaneous devices. There are several instances (e.g., cochlear implants) where medical devices have undergone sophisticated re-engineering to circumvent the problem of the skin biointerface (e.g., wireless). There are certainly other ideas for assistive technologies that are not feasible, nor under consideration for development, due to this problem. The penetration of medical devices through the skin is in many respects the ultimate unsolved barrier to the patient-machine biointerface. If a suitable solution could be found to this problem, where percutaneous devices could function for years to the lifetime of the patient with minimal to no inflammation or infection, then an exciting new chapter could unfold in the design of new assistive technologies.

ASSESSMENT OF ACUTE MILD TRAUMATIC BRAIN INJURY BY QUANTITATIVE EEG ANALYSIS

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Background and Objectives: There are four related clinical research projects in the Mission Connect Mild TBI Translational Research Consortium. The Neurophysiology Core will provide electroencephalographic (EEG) data for one of its projects that will investigate the early (< 24 hr) diagnosis of mild traumatic brain injury (MTBI) and early differentiation of MTBI from post-traumatic stress disorder (PTSD).

Specific Aim 2.1.1: To investigate differentiation of patients sustaining MTBI from a group of patients with orthopaedic injury (OI) based on cognitive performance, diffusion tensor imaging (DTI), and EEG findings within 24 hours after injury and at follow-up over a 6-month interval.

Specific Aim 2.1.2: To investigate reporting of acute stress disorder (ASD) symptoms, acute post-concussion symptoms (PCS) in relation to DTI and EEG by groups of patients with MTBI or OI.

Methodology: A 30- to 60-minute EEG will be recorded within 24 hours of injury and then 3 months later utilizing a standard clinical protocol.

Visual Analysis: The following parameters will be described: Frequencies of the occipital dominant alpha rhythm and the background activity in the frontal, temporal, and central regions, and the presence of any asymmetries of the background rhythms, focal slow wave activity or epileptiform activity.

Computer-Based Quantitative Analysis: Eight referential channels will be used for the quantitative analysis (Fp1, Fp2, C3, C4, O1, O2, T3, T4). Extensive EEG analysis software/hardware has been developed within the Section of Neurophysiology, Department of Neurology, Baylor College of Medicine, using the Matlab programming language, and will be available for this project. The background characteristics of each 30-second EEG sample will be determined through the application of a battery of procedures that will permit the characterization of frequency components, amplitude distribution, rhythmicity, continuity, and bilateral symmetry. Measured parameters for each EEG sample include: ***Power spectra*** will be based on the fast Fourier transform (FFT) to provide information concerning the average amplitude of specific frequency components in the eight anatomical regions studied. ***Period/amplitude analysis*** will consider the EEG signal from each channel on a wave-by-wave basis and provide estimates of average frequency, average amplitude, and maximal amplitude for each of the eight EEG channels. ***Coherence analysis*** will provide a frequency-specific measure of correlation, or similarity, between two channels as a measure of interhemisphere symmetry. ***Data Analysis.*** Using multivariate statistical techniques, data analyses will examine the patterns of recovery in behavioral, cognitive, and EEG function, beginning within 24 hours of injury and progressing through the 6-month post-injury period.

Results: This initial phase of the project has been directed toward the establishment of protocols and logistics of EEG recordings, and the pilot testing of computer-based quantitative EEG analysis.

Conclusions: Visual and computer-based analysis of EEG are potentially useful tools in diagnosis of MTBI and its early differentiation from PTSD. The Integrated Clinical Protocol of Mission Connect is designed to define that role.

Impact: The contributions of the Neurophysiology Core to the Integrated Clinical Protocol of Mission Connect may establish the clinical utility of EEG in the early diagnosis of MTBI and its differentiation from other disorders.

This work was supported by the U.S. Army Medical Research and Materiel Command under W81XWH-08-2-0149.

EYE-TRACKING RAPID ATTENTION COMPUTATION PROTOTYPE DEVELOPMENT FOR MILD TRAUMATIC BRAIN INJURY

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Background and Objectives: It is estimated that about 10%, or 150,000, of our returning soldiers from the Afghanistan and Iraq wars have TBI symptoms, mainly from exposure to bomb blasts. The concussion causes anterior brain white matter that connects areas that network to produce attention. The result of these small tears is that individuals cannot time interactions and end up with difficulty conversing, understanding, memory, and daily activities that involve interactions that are temporally demanding. These difficulties become extremely frustrating to the individual and often result in the development of anger, depression, and substance abuse. Most individuals are undiagnosed and unaware of their deficiencies. Currently, the tests used to try to diagnose attention problems take at least 20 minutes, are imprecise, or rely on cognitive tests given by trained medical personnel. The EYE-TRAC (EYE-Tracking Rapid Attention Computation) device, funded under the TBI/PTSD Advanced Technology Award in 2008, will be developed to diagnose attention and memory problems from concussion (mild traumatic brain injury–TBI) in civilians and military personnel.

Brief Description of Methodologies: Through our previous research, we have found that attention depends on accurate predictive timing. One's thinking has to be ahead of one's actions or incoming sensory information to optimize performance. When predictive timing is out of synch, performance becomes variable and errors occur more frequently. The Brain Trauma Foundation has developed a very accurate and quick measure of predictive timing assessment using eye-target tracking measurement. How good one's attention is can be assessed within seconds. Baseline measurements are being obtained in a large number of subjects to establish thresholds between different age groups and varying fatigue levels. These measures will be used in the military to link task performance requirements with attention capability and design software so that it can distinguish the spectrum of concussion and fatigue.

Results to Date: We have developed a preliminary ergonomic prototype and performed kinematic analysis to determine the optimal design for a mobile fieldable device in terms of stability between the EYE-TRAC and the eye. Motion data recorded with a motion analysis system that tracks markers placed on the EYE-TRAC and a mouth guard to measure the relative motion between the eyes and EYE-TRAC demonstrates the greatest stability can be obtained from a helmet-mounted device with handles and a chin rest or tripod support (0.08445 ± 0.11135 mm).

Conclusions: Stability requirements for the eye tracker appear to be below the required threshold of vibrations necessary for accurate capture of variation in smooth eye pursuit, which is the synchronization lag between the subject's eyes and moving target.

Impact Statement: The EYE-TRAC device will be able to diagnose very subtle attention problems quickly. A commanding officer can rapidly tell whether a soldier is fit for duty, thereby reducing the chance of injury to the soldier and team. This device also will be very useful in diagnosing a concussion in sports and in the emergency room in civilian hospitals, where concussions from car crashes are a daily occurrence. In addition, this device may be used to prevent unnecessary CT and MRI scans, thus lowering medical costs.

This work was supported by the U.S. Army Medical Research and Materiel Command under W81XWH-08-1-0646.

DEVELOPING A SOCIAL SUPPORT INTERVENTION FOR YOUNG MILITARY PERSONNEL

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Background: There has been little focus on the mental health needs of young military personnel and their families of origin although approximately 33% of Reserve and Guard personnel are 25 years old or younger (Department of Defense, 2007). Many are single, often with some dependence on families of origin (parents and siblings) for support. There is considerable evidence that social supports can influence post-traumatic responses (Guay, Billette, and Marchand, 2006). The primary goals of this project are (a) to assess the mental health needs of single, young Reserves and National Guard personnel and their families of origin throughout deployment cycles, with particular focus on relationship issues after deployment, and (b) to adapt an existing family-based intervention, developed for returning military personnel who are parents, to create an intervention for young adult military personnel and their families of origin or other significant support systems.

Methodologies: A semi-structured interview has been developed, and interviews with members of the National Guard and Reserves and family members are being used to assess family relationship issues and needs after the return of single service members from deployment. Interviews are in progress and, when complete, will be used to modify the intervention, which is currently being developed. This psychoeducational intervention will be used in our center's clinical program, then modified further based on the feedback. The Family Emotional Involvement and Criticism Scale will be used to assess the impact of our intervention on these factors.

Results and Conclusions: Based on our review of the literature and consultation with experts, we have developed a preliminary version of a 7-module (approximately 7-session) intervention. In taking into account the developmental needs of the target population, one issue we have addressed is assisting this age group with balancing autonomy and relationship issues. Thus, we have addressed the need for sensitivity regarding providing control to the young, single service members in terms of how to involve family, as well as the possibility that other significant individuals may serve as important sources of support and should participate in addition to or in place of family members. The intervention assists with perspective-taking and appreciating the impact of deployment on all parties involved (i.e., service members and their families or other significant supports). In addition to assisting service members and their families or other supportive individuals with communication and affect regulation, the intervention allows the opportunity for "meaning making" regarding the deployment experience and how this fits within young service members' developmental trajectory.

Impact: The intervention being developed is designed to decrease family/relationship stress and enhance social support for young, single service members after deployment, with the goals of increasing their quality of life and resilience, including the ability to benefit from more symptom-focused treatment if it is warranted.

This work was supported by the U.S. Army Medical Research and Materiel Command under W81XWH-08-2-0059.

A RANDOMIZED TRIAL OF MUSCULOSKELETAL PAIN TREATMENT IN A MILITARY POPULATION: A PRELIMINARY STUDY LEADING TO THE STRONGSTAR INVESTIGATION

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Background and Objectives: To evaluate the effectiveness of an Interdisciplinary Chronic Pain Rehabilitation Program (FORT), designed to decrease chronic musculoskeletal pain, increase function, and retain military members on active duty. Based on civilian research, the FORT program was expected to facilitate return to active duty of military personnel suffering from musculoskeletal disorders and work disability. This is an extension of an earlier published study with the addition of 1-year post-treatment outcomes assessment.

Methodology: A two-group randomized design was used to compare the FORT treatment to a standard treatment-as-usual group (TAU). Evaluations of groups were conducted at pretreatment, post-treatment, and at 6- and 12-month follow-up periods to determine outcomes on variables such as self-reported pain and disability, function, return to active duty, and health-care utilization. Power analyses resulted in recruitment targets of 45 randomized participants per arm.

Results: Data analyses revealed significantly better treatment benefits for the FORT participants at post-treatment, and at 12 months for the following domains: Functional capacity, pain severity, pain-related disability, and pain-related concerns about physical activity. FORT patients also were 6 times less likely to seek high levels of health care treatment for pain at 1 year, 3.6 times less likely to rely on multiple pain medications, and twice as likely to remain on active duty at 1 year.

Conclusions: Results show an interdisciplinary pain program is effective in a military setting. There were significant improvements across physical and psychological outcomes at post-treatment and 1 year. Finally, a greater number of FORT participants were able to return to active duty, relative to TAU.

Impact: These results have significant military relevance, demonstrating for the first time that a program specifically targeting military personnel (FORT) can be successful. With more service members being evacuated out of combat theaters because of pain conditions, an increased use of FORT programs will be helpful to maintain fitness for duty including deployment. These results also paved the way for a new research protocol submission that has now been funded through STRONGSTAR.

STRONGSTAR: Chronic pain and PTSD are often co-morbid conditions. The STRONGSTAR project *Treatment of PTSD and Chronic Pain after Traumatic Orthopedic Injury: A Randomized Clinical Trial* will use the established FORT pain treatment in combination with an abbreviated prolonged exposure treatment. It is hypothesized that treatment of pain or PTSD is better than TAU. It also is hypothesized that treatment of either chronic pain or PTSD individually will not be as effective as treatment of both conditions. Qualified participants will be randomly assigned to one of four study conditions including pain treatment (Pain) only, PTSD treatment (PTSD) only, pain and PTSD treatment (P&P), and treatment as usual (TAU). The Pain, PTSD, and P&P arms will have 10 sessions with a therapist and the TAU arm will continue per physician's prescription. Physical, psychosocial, and socioeconomic outcomes will be assessed at pre- and post-treatment, 6, and 12 months.

This work was supported by the U.S. Army Medical Research and Materiel Command under W81XWH-08-2-0113 and the National Institutes of Health.