NATO Advanced Research Workshop

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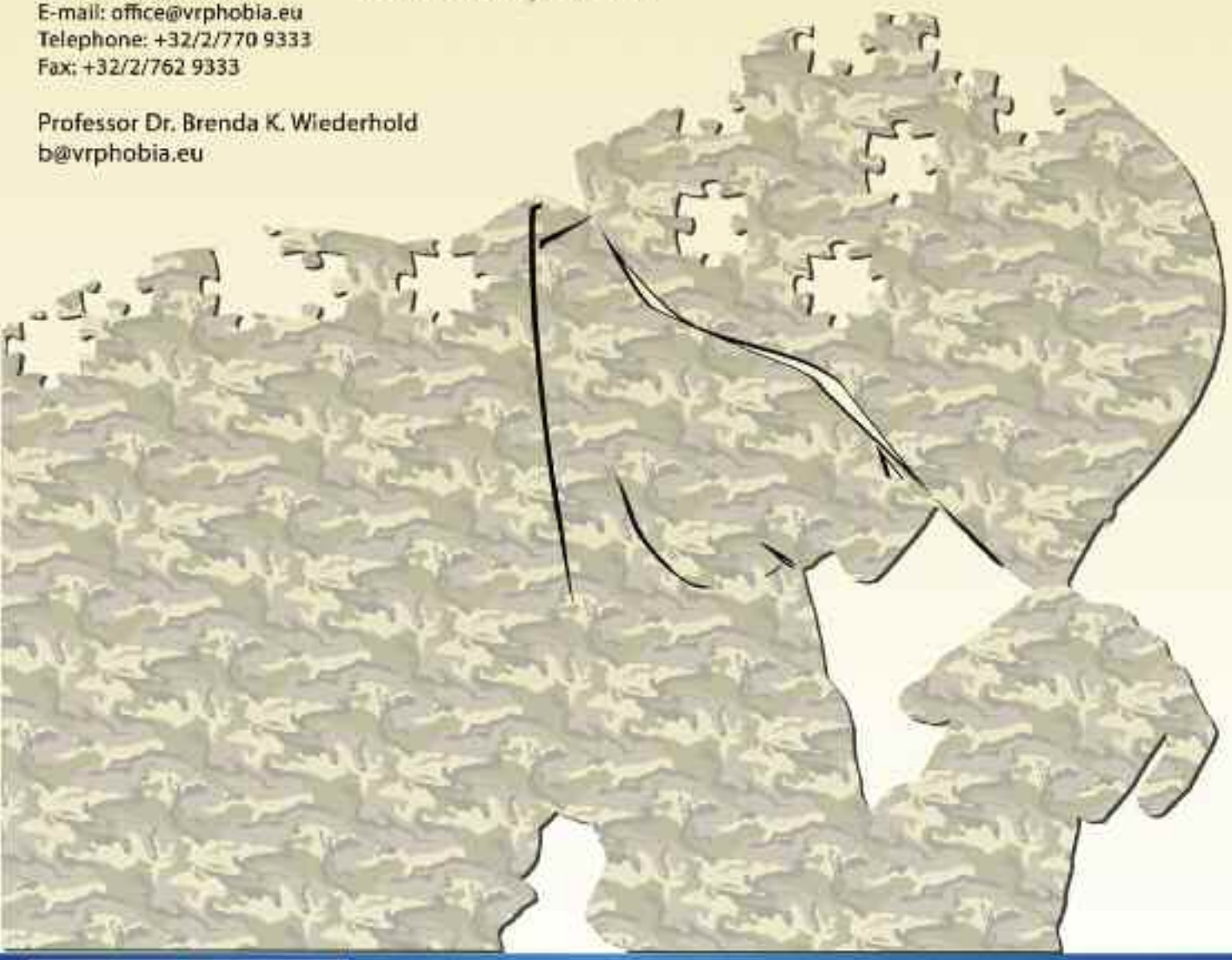
Wounds of War IV: Pain Syndromes - From Recruitment to Returning Troops

September 30-October 2, 2011
Südkärnten, Austria



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SCIENTIFIC PROGRAM
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1. INTRODUCTION

This Advanced Research Workshop (ARW) is being convened to discuss the topic of Pain Syndromes in our service men and women. This workshop follows up on three previously held successful NATO-sponsored ARWs, namely:

- "Wounds of War I: Lowering Suicide Risk in Returning Troops"
  - October 14-17, 2007; Südkärnten, Austria
- "Wounds of War II: Posttraumatic Stress Disorder"
  - October 19-21, 2009; Südkärnten, Austria
- "Wounds of War III: Traumatic Brain Injury"
  - February 20-22, 2011; Vienna, Austria

The scientific program includes psychological experts and military personnel from around the world whose research has shown that those who have served in both combat missions and peacekeeping operations are at an increased risk for pain.

This specialized workshop will explore four main criteria:

1. Vulnerability to Pain Syndromes: are certain types of people at higher risk for Pain Syndromes (background, ethnicity, childhood trauma, etc.)?

2. Diagnosis and Assessment of Pain Syndromes: which methods are currently being used to diagnose and assess these syndromes?

3. Treatment of Pain Syndromes: what are the latest treatment and therapy opportunities for soldiers who experience Pain Syndromes?

4. Clinical Updates on Pain Syndromes: what can we learn from recent clinical updates on Pain Syndromes?

Our hope is that through this workshop, we can come to understand what programs are already in place for the detection, assessment, prevention, and treatment of Pain Syndromes. We can then learn from these existing plans and begin to formulate a more common set of best practices and guidelines which can be implemented throughout organizations in all our countries, having as our common goal to always seek to serve our service members more effectively.

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2. SPONSORS

Workshop organizers Interactive Media Institute and the Virtual Reality Medical Institute would like to thank the sponsors of this Advanced Research Workshop listed below. Without their support this event could not have taken place.

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FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING

Virtual Reality Medical Center

Interactive Media Institute

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3. WORKSHOP CO-ORGANIZERS

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4. MEETING SITE

The Advanced Research Workshop (ARW) entitled "Wounds of War IV: Pain Syndromes – From Recruitment to Returning Troops" will be held September 30-October 2, 2011 at:

Hotel Amerika-Holzer am See
Am See IX
9122 St. Kanzian
Südkärnten, Austria
Tel: +43 4239/2212
E-mail: hotel@amerika-holzer.at
http://www.amerika-holzer.at

Registration on Thursday, September 29, 2011 will take place in the conference area from 18:00 to 20:00.

All participants are kindly reminded to bring a passport or ID card with them in order to obtain a security badge to gain access to the workshop events. A badge will be issued to each participant registered. You are kindly requested to take care of your badge. Badges will not be reissued during the week.

You are requested to wear your meeting badge at all times in the conference area and at all workshop events.

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PRE-CONFERENCE ACTIVITIES

Thursday, September 29th, 2011

18:00-20:00 Conference Arrival and Registration

19:00 Welcome Reception

CONFERENCE DAY 1

Friday, September 30th, 2011

7:30 Breakfast

8:55 Introduction
Prof. Dr. Brenda K. Wiederhold
Interactive Media Institute
United States of America
Virtual Reality Medical Institute
Brussels, Belgium

9:00 Introduction
Prof. Dr. Kresimir Cosic
University of Zagreb Faculty of Electrical Engineering and Computing
Croatia

9:10 Welcome
Representative from Austrian Ministry of Defence

9:20 Official Conference Photograph

Session I: Vulnerability to Pain Syndromes
Session Chair*: Dr. Robert Bray*

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9:40 "Misuse of Prescription Pain Medications in U.S. Active Duty Service Members"
Dr. Robert Bray
Research Triangle Institute
United States of America

10:05 **re**"Theories of Phantom Limb Pain and Use of Mirror Therapy"
Cmdr. Dr. Jack Tsao
United States Navy
United States of America

10:30 Coffee break

11:00 "An Examination of the Relationship Between Childhood Adversity and Mental Disorders in the Canadian Military"
Christine A. Henriksen
University of Manitoba
Canada

11:25 "The Physical and Mental Health of Female Military Personnel"
Natalie Mota
University of Manitoba
Canada

11:50 "Behind Pain: Genetics"
Alja Videtič Paska
University of Ljubljana
Slovenia

12:15 Panel Discussion

12:30 Lunch

Session II: Diagnosis and Assessment of Pain Syndromes
Session Chair*: Dr. David Thomas*

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14:00 "The National Institutes of Health Pain Consortium's Efforts to Improve Pain Education in Medical, Dental, and Nursing Schools Using the 'Centers of Excellence' Model"
Dr. David Thomas
National Institute of Drug Abuse
United States of America

14:25 "Psychological Pain and Suicidal Behavior"
Dr. Peter Pregelj
University Psychiatric Hospital Ljubljana
Slovenia

14:50 "A Review of Pain Syndromes"
Prof. Dr. Brenda K. Wiederhold
Interactive Media Institute
United States of America
Virtual Reality Medical Institute
Brussels, Belgium

15:15 Coffee break

15:45 "Neurobiological Basis of Pain Syndrome in War Veterans with PTSD: Preliminary Findings"
Prof. Dr. Nela Pivac
Rudjer Boskovic Institute
Croatia

16:10 Panel Discussion

16:35 Session 2 Adjourns

17:30 Dinner on Your Own

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CONFERENCE DAY 2
Saturday, October 1st, 2011

7:30 Breakfast

9:00 Brief Review of Day 1 and Introduction to Day 2
Prof. Dr. Brenda K. Wiederhold
Interactive Media Institute
United States of America
Virtual Reality Medical Institute
Brussels, Belgium

9:15 Working Group Sessions

Group I: Vulnerability to Pain Syndromes
Leader: Dr. Robert Bray

Group II: Diagnostic and Assessment of Pain Syndromes
Leader: Dr. David Thomas

Group III: Clinical Updates on Pain Syndromes
Leader: doc.dr.sc. Jasna Grkovic

Group IV: Treatment of Pain Syndromes
Leader: Dr. Nisha Money

12:00 Lunch

Session III: Clinical Updates on Pain Syndromes
Session Chair*: doc.dr.sc. Jasna Grkovic*

14:00 "Diversity of Pain Syndromes in War Veterans with Posttraumatic Stress Disorder"
doc.dr.sc. Jasna Grkovic
Clinical Hospital Centre Rijeka
Croatia

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14:25 "Biofeedback/Neurofeedback Treatment of PTSD War Veterans with Chronic Pain Syndromes: Case Reports"
Dr. Jambrošić Sakoman
University Hospital Dubrava
Croatia

14:50 "Death Rescued Him from Pain – A Report of Complex Therapy of ISAF Polish Soldier with an Extreme Multi-Organ Injury"
Anna Wachowiec
Military Institute of Health Services
Poland

15:15 Coffee Break

15:45 "Body Pain in PTSD – A Case Report on Psychodermatosis in Polish Veteran of ISAF"
Anna Rączkowska
Military Institute of Health Services
Poland

16:10 Panel Discussion

16:35 Session III Adjourns

18:00 Gala Dinner – *Formal Attire*

CONFERENCE DAY 3
Sunday, October 2nd, 2011

9:15 Brief Review of Day 2 and Introduction to Day 3
Prof. Dr. Brenda K. Wiederhold
Interactive Media Institute
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Reports from Working Groups

9:30 Working Group I Report
Leader: Dr. Robert Bray

10:00 Working Group II Report
Leader: Dr. David Thomas

10:30 Working Group III Report
Leader: doc.dr.sc. Jasna Grkovic

11:00 Coffee Break

11:30 Working Group IV Report
Leader: Dr. Nisha Money

12:00 Lunch

Session IV: Treatment of Pain Syndromes
Session Chair*: Dr. Nisha Money*

13:35 "Global Health Initiatives for Pain and Suffering: Just Mitigate or Eliminate? (An Integrative Medicine and Holistic Approach for the Full Pain Spectrum while Optimizing Human Performance)"
Dr. Nisha N. Money
Global Healing Initiatives, LLC
United States of America

14:00 "Comparing Distraction/Relaxation Modalities with Chronic Pain Patients"
Major Melba Stetz
Tripler Army Medical Center, Hawaii
United States of America

14:25 "Risk Assessment for Emergency Situations"
Prof. Dr. Liviu-Daniel Galatchi
Ovidius University of Constanta
Romania

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14:50 "Stress Prevention May Reduce Pain: Concepts and Programs of Prevention in the German Armed Forces"
Dipl.-Psych. Herbert Jacobs
German Armed Forces Hospital Berlin
Germany

15:15 Coffee Break

15:45 "Chronic Lower Back Pain in Chronic Combat-related Posttraumatic Stress Disorder"
Marijana Bras and Veljko Djordjevic
University Hospital Centre Zagreb
Croatia

16:10 Panel Discussion

16:35 Session IV Adjourns

16:35 Closing Comments
Prof. Dr. Brenda K. Wiederhold
Interactive Media Institute
United States of America
Virtual Reality Medical Institute
Brussels, Belgium

17:30 Dinner on Your Own

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SESSION I: VULNERABILITY TO PAIN SYNDROMES

Misuse of Prescription Pain Medications in U.S. Active Duty Service Members

Robert M. Bray[a,1], Kristine Rae Olmsted[a] and Jason Williams[a]

[a]RTI International

Advances in battlefield medicine and evacuation have resulted in unprecedented numbers of injured service members surviving what would previously have been fatal injuries. These wounded warriors are faced with a future that may include a need to effectively address chronic pain while mitigating the risks of long-term use of prescription pain medications. In addition, chronic pain is also frequently reported among those with Posttraumatic Stress Disorder and/or traumatic brain injury. As a result, pain and chronic pain control are of significant interest to military officials and policy makers. Despite this interest, there is a paucity of documentation regarding the prevalence of prescription opioid misuse in the active duty military population.

This presentation will examine (a) trends in prescription drug misuse, (b) the role of prescription pain medications in prescription drug misuse, and (c) the correlates and predictors of prescription drug misuse and prescription pain medication misuse among active duty personnel. Data are drawn from the U.S. Department of Defense Surveys of Health Related Behaviors among Active Duty Military Personnel. These surveys are comprehensive population-based studies conducted at over 60 installations worldwide. The most recent survey conducted in 2008 had nearly 25,000 participants.

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Theories of Phantom Limb Pain and Use of Mirror Therapy

Jack W. Tsao[a,b,1]

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[b]*Uniformed Services University of the Health Sciences, Department of Neurology, Bethesda, MD, USA*

Modern warfare has combined deadlier weapons with more resistant armor and has led to an increasing number of service members with multiple limb amputations. As of September 1, 2010 there have been 1,071 U.S. service members who have lost at least one limb in combat in Iraq or Afghanistan with 24.4% being multiple-limb amputees. Over 50% of these amputations stem directly from improvised explosive blasts. A debilitating effect of amputation is phantom limb pain (PLP), the painful sensation that the amputated limb is still present. Regardless of the cause of amputation, greater than 85% of all amputees experience vivid PLP after amputation, with this percentage being even greater after traumatic amputations, and affects rehabilitation, prosthetic use, and quality of life. There are several theories about the origin of PLP – learned paralysis of the limb, dissociation between visual and proprioceptive feedback to the brain, and the presence of proprioceptive memories. Phantom pain is difficult to treat using medications. However, case studies have shown the ability of mirror therapy to relieve pain and cramping, and our research group performed the only sham-controlled, crossover trial demonstrating the efficacy of mirror therapy in treating this painful condition. In this therapy, subjects place a plane mirror parasagitally facing their intact limb. While moving the intact limb and viewing the movements in a mirror, the subject attempts to move his/her phantom limb in a similar manner. Control groups included a group trained in mental visualization as well as a group that performed the same movements with a covered mirror. Eighteen subjects (six in each group) completed the study. Utilizing this therapy for 15 minutes a day for four weeks resulted in a dramatic decrease in PLP, significantly more than with mental visualization ($p=0.002$) or covered mirror ($p=0.04$) therapy. PLP also decreased in eight of nine patients (89%) who crossed over to mirror therapy from either the covered mirror or mental visualization groups ($p=0.008$). This talk will discuss which theories are supported by the data and how mirror therapy works to decrease PLP.

Disclaimer

The opinions or assertions contained herein are the private views of the author and are not to be construed as official or as reflecting the view of the United States Department of the Navy or the Department of Defense.

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An Examination of the Relationship Between Childhood Adversity and Mental Disorders in the Canadian Military

Christine A. Henriksen[a], Shay-Lee Bolton[b], Tracie O. Afifi[c], Murray B. Stein[d], Gordon J. G. Asmundson[e] and Jitender Sareen[f,1]

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[b]Department of Community Health Sciences, University of Manitoba
[c]Departments of Community Health Sciences, Psychiatry, and Family Social Sciences, University of Manitoba
[d]Departments of Psychiatry and Family & Preventive Medicine, University of California San Diego and VA San Diego Healthcare System
[e]Department of Psychology and Anxiety and Illness Behaviours Laboratory, University of Regina
[f]Departments of Psychiatry, Psychology, and Community Health Sciences, University of Manitoba

Background. Research has shown that exposure to adverse childhood experiences (ACEs) is related to numerous mental and physical health problems in adulthood. While similar results have been found in military samples, the research in this area has been limited by only examining a limited number of ACEs and psychiatric disorders.

Objectives. The objectives of the current paper are: 1) to summarize the extant literature on the relationship between ACEs, pain, physical health conditions, and mental disorders; and 2) to examine the relationship between ACEs, combat stress, and adult mood and anxiety disorders among military personnel.

Methods. Data came from the Canadian Community Health Survey – Canadian Forces Supplement (CCHS-CFS), a cross-sectional population-based survey of active Canadian Forces personnel (N=8,441; ages 16-54 years; response rate: 81%). DSM-IV mental disorders (major depressive disorder, Posttraumatic Stress Disorder, generalized anxiety disorder, panic attacks, and social phobia) were assessed with the Composite International Diagnostic Interview. The following ACEs were assessed: childhood physical and sexual abuse, economic deprivation, exposure to domestic violence, parental divorce/separation, parental substance abuse problems, hospitalization as a child, and apprehension by a child protection service.

Results. We have found that experiencing an increasing number of ACEs was associated with an increased likelihood of experiencing any adult mental disorder, and exposure to combat further increased this likelihood.

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Conclusions. Experiencing multiple ACEs increases the risk of adult mood and anxiety disorders. Intervention strategies should focus on targeting soldiers who have been exposed to ACEs and particularly those exposed to a multitude of ACEs.

Acknowledgements: Preparation of this paper was supported by a Canadian Institutes of Health Research (CIHR) operating grant (#184490), New Investigator Award (#152348), a Manitoba Health Research Council Chair award (Dr. Sareen), and a Canadian Institutes of Health Research (CIHR) Fredrick Banting and Charles Best Canada Graduate Scholarship – Doctoral Award (Ms. Bolton).

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The Physical and Mental Health of Female Military Personnel

Natalie Mota[a,b], Maria Medved[b], JianLi Wang[c], Gordon J.G. Asmundson[d], Debbie Whitney[e] and Jitender Sareen[a,b,f,1]

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With the increasing number of female military personnel, it is pivotal that appropriate resources are in place for their health needs. This presentation reviews the current knowledge on the physical and mental health of female personnel in relation to their military male counterparts, as well as the unique stressors faced by females during service and deployment that likely make them susceptible to developing mental and physical health problems. Within this aim, the results of two recent projects by our research group are discussed. In the first study, sex differences in a range of mental disorders were investigated in a representative sample of regular and reserve status Canadian Forces personnel. After adjusting for covariates, unique sex differences in mental disorder prevalence were found depending on whether respondents were within the regular or reserve force. The other, in-progress, investigation has used a nationally representative U.S. civilian sample to examine the physical health and perceived bodily pain experienced by women who endorsed having been involved in combat. These women were found to be approximately twice as likely as men who endorsed combat to report having any physical condition in a model adjusting for age and household income (adjusted odds ratio [AOR] 2.02, 95% confidence interval 1.04-3.94). Further, combat women were more likely than general population women to report arteriosclerosis/hypertension, obesity, and any physical condition (AOR range 2.27-2.72). Given the consistent link between physical and mental health, these findings are noteworthy for health professionals who treat female personnel within either of these domains.

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Behind Pain: Genetics

Alja Videtič Paska[a,1]

[a]*University of Ljubljana*

An extensive number of different studies, from animal models to clinical and family studies, support the important role of genetic background and epigenetic factors, besides the effects of environmental milieu, on the variability of pain response. So far precise mechanisms of pain perception and transmission in the central nervous system have not been fully understood. However, comprehensive data imply that the disinhibition and imbalance of the serotonin and norepinephrine neurotransmitters might play key roles. Both neurotransmitters have complex pathways, comprised of numerous receptors, autoreceptors, transporters and enzymes. Recently, it has been shown that clinically relevant inter-individual differences in pain perception and regulation are importantly influenced by a tri-allelic polymorphism in a serotonin transporter gene. There is another important group of proteins in the central nervous system, neurotrophins, which regulate cell growth and survival, differentiation, apoptosis, and cytoskeleton restructuring. Dysregulation of brain-derived neurotrophic factor has been found in individuals with traumatic brain injury and Posttraumatic Stress Disorder, with chronic pain being one of the common clinical features.

Genomics has a promising potential to contribute to advances in the elucidation of pain mechanisms and control. With modern laboratory techniques that enable the identification of candidate genes by linkage mapping, whole-genome association and single gene association studies, genes responsible for different pain disorders could be isolated in the near future. Knowledge of the related genetic factors could further support another important issue – personalized medicine – that could improve the efficacy of pain management and lower adverse event profiles.

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SESSION II: DIAGNOSIS & ASSESSMENT OF PAIN SYNDROMES

The National Institutes of Health Pain Consortium's Efforts to Improve Pain Education in Medical, Dental, and Nursing Schools Using the "Centers of Excellence" Model

David A. Thomas[a,1], Matthew R. Cohn[a], Richard A. Denisco[a], Denise A. Pintello[a], Redonna K. Chandler[a] and Carol M. Krause[a]

[a]The National Institute on Drug Abuse (NIDA), The National Institute of Health (NIH), Bethesda, MD, USA

Pain is a major health problem. The American Pain Society estimates that 75 million people in the U.S. suffer from chronic pain. Data from the Center for Disease Control (CDC) indicate that prescribing of prescription opioids increased threefold in the last 20 years. Although a direct link has not been established, with this increase in prescribing, another major health problem has emerged: prescription opioid abuse. At the fulcrum of these two health crises are healthcare providers, doctors, dentists, nurses and others. Most of these professionals encounter people in pain on a regular basis, and many are involved with pain diagnosis and treatment. Yet the topics of pain diagnosis and treatment get relatively little attention in the formal training of most healthcare professionals. The National Institutes of Health (NIH) Pain Consortium is addressing this issue by establishing Pain Centers of Excellence (PCoEs). These PCoEs will be established in existing educational institutions, where pain experts at these institutions develop and implement curricula to help train our next generation of healthcare professionals in the diagnosis and management of pain. The anticipated result is that these PCoEs will provide healthcare professionals with the tools to better manage pain, while minimizing side effects and opioid abuse.

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Psychological Pain and Suicidal Behavior

Peter Pregelj[a,b,1]

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Severe psychological or mental pain is defined as an experience of unbearable torment, which can be associated with a psychiatric illness (e.g., Posttraumatic Stress Disorder) or a tragic loss such as the death of an important person. Conversely, the dominant model in the perception of physical pain describes a "neuromatrix" which is activated in response to painful stimuli and is also regulated by psychological factors. It has been reported that emotions interact with the somato-sensory-discriminant system and that this interaction can produce a sensitization or desensitization to painful stimuli. Further, hypnotically suggested pain seems to produce a pattern of brain region activation similar to the pattern associated with an actual painful stimulus, indicating that mechanisms in the central nervous system may be sufficient to produce the experience of pain even in the absence of external stimulation of the peripheral nerves. The interpersonal-psychological theory of suicide has proposed that exposure to painful and provocative experiences, such as combat, contribute to fearlessness towards death and increased physical pain tolerance, which serve to enhance the individual's capability of resorting to suicidal behavior. It was further reported that psychological pain is a useful and unique construct in patients with major depressive episodes that can be reliably assessed and may aid in the evaluation of suicidal risk. However, not only environmental factors but also genetic predisposition seems to play an important role in the pathogenesis of suicidal behavior. The relationship between genes and environmental factors involved in suicidal behavior will be discussed.

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A Review of Pain Syndromes

Brenda K. Wiederhold[a,1] and Mark. D. Wiederhold[b]

[a]Virtual Reality Medical Institute, Belgium, Brussels
[b]Virtual Reality Medical Center, San Diego, California

Pain syndromes are increasingly prevalent in the military and the causes, resulting complications, existing treatment and possibilities for improved care in the future are in need of attention. By constantly being exposed to combat and living in weapon- and explosive-filled war zones, service men and women face complicated injuries, including amputations, penetrating wounds, spinal cord injuries, and traumatic brain injuries, as well as undergo multiple surgical procedures. The unique nature of the jobs of military personnel puts their bodies at a greater risk for pain syndromes, which are spurred by traumas of both high and low magnitudes. Although present in isolation, pain syndromes are significantly higher in frequency when present with Posttraumatic Stress Disorder (PTSD) and other psychiatric disorders such as depression; more than half of those with PTSD also suffer from pain syndromes. Pain syndromes and PTSD are mutually maintaining, wherein the existence of both conditions can worsen the symptom severity of either condition. It is for this reason and more that a distributed approach is necessary for the treatment of pain syndromes. A shift in focus must be made from the disorder to the individual, as well as from a dependency on opioid painkillers to one on multidimensional treatment plans in order to overcome this undeniable rise in pain syndromes.

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Neurobiological Basis of Pain Syndrome in War Veterans with PTSD: Preliminary Findings

Nela Pivac[a,1], Gordana Nedic[a], Matea Nikola[a], Marina Fistonic[b], Marin Kovacevic[b], Maja Mustapic[a], Ines Gveric Korkut[b], Mirjana Grubisic-Ilic[b], Dragica Kozaric-Kovacic[b] and Dorotea Muck-Seler[a]

[a]Division of Molecular Medicine, Rudjer Boskovic Institute, Bijenička cesta 54, HR-10002 Zagreb, Croatia,
[b]Referral Centre of the Ministry of Health and Social Welfare of the Republic of Croatia for the Stress Related Disorders, Department of Psychiatry, Dubrava University Hospital,
Avenija Gojka Suska 6, HR-10000 Zagreb, Croatia

Posttraumatic Stress Disorder (PTSD) is assumed to represent a marker of stress vulnerability rather than a reaction after exposure to trauma. The underlying biology of PTSD consists of the pre-traumatic biological and physiological risk factors that affect the ability to cope with the traumatic event. Diagnoses involving pain are extremely common among war veterans. The prevalence of chronic pain occurs more frequently in subjects with PTSD (25-80%) than in control subjects, while chronic pain patients have PTSD more frequently than other groups. It is proposed that PTSD mediates chronic pain symptoms. The biological substrates of vulnerability to PTSD and pain include central neurotransmitters, neurotrophic factors, and neuroendocrine systems, while physiological factors include those related to attention, hyperarousal, avoidance, cognition, and anxiety. The severity of PTSD has been found to be correlated with the severity of chronic pain. The neurobiological mechanisms underlying altered pain perception in combat exposed veterans with PTSD are still unclear. Therefore, the aim of this preliminary study was to assess peripheral biomarkers (platelet serotonin (5-HT) concentration, platelet monoamine oxidase type B (MAO-B) activity) and to determine genetic polymorphisms of MAO-B, dopamine-beta-hydroxylase (DBH), catechol-o-methyltransferase (COMT), brain-derived neurotropic factor (BDNF), serotonin transporter (5-HTT), and serotonin receptor 2A (5HT2A), in male Croatian war veterans with current and chronic combat-related PTSD subdivided into those with or without pain syndrome. The objectives were to elucidate the distribution of the genotypes or alleles for MAO-B intron 13, -1021C/T DBH, Val158/108Met COMT, Val66Met BDNF, 102T/C 5HT2A polymorphisms and 5-HTT gene-linked polymorphic region (5-HTTLPR), and to explore the relation between these variants and pain syndrome in combat-related PTSD. The hypothesis of this study was that these biomarkers would differ between veterans with or without pain syndrome. Since it has been shown that early treatment of pain would prevent the development of chronic pain syndrome, this study aimed to find biomarkers that would provide earlier treatment of pain syndrome in order to reduce consequences of the pain-related conditions in vet-

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erans with PTSD. Participants (N=142) included in the study were unrelated, medication-free Caucasian male war veterans with combat-related PTSD. Veterans had current and chronic PTSD, diagnosed using the Structured Clinical Interview (SCID) based on DSM-IV Disorders. Veterans were categorized according to the presence of pain syndrome into those with or without pain syndrome. The biological and genetic markers were determined from the blood samples using biochemical and genetic analyses. The results, expressed as means ± standard deviations, were evaluated using one-way analysis of variance, and differences in the genotype and allele frequencies were evaluated using a $\chi 2$ test. Although altered platelet 5-HT concentration was associated with particular symptoms in PTSD, platelet 5-HT concentration was not significantly different between veterans with or without pain syndrome. These results suggest that platelet 5-HT is not a biomarker of the pain syndrome in PTSD. Platelet MAO-B activity, controlled for the smoking status, did not differ significantly between veterans with or without pain syndrome. These data did not confirm the hypothesis that platelet MAO-B might be used as a peripheral marker of the pain syndrome in PTSD. The frequencies of the MAO-B intron 13, DBH-1021C/T, COMT Val158/108Met, BDNF Val66Met, 102T/C 5HT2A, 5HTTLPR variants did not differ significantly between groups of veterans with PTSD with or without pain syndrome, presumably due to the small number of included veterans. In conclusion, our preliminary findings suggest that although combat experience affects the circuits mediating stress response, as well as neural circuitry underlying pain processing, the selected biomarkers, which have been shown to be associated with particular psychopathological symptoms or altered behaviors in PTSD, were similar between groups of veterans with PTSD with or without pain syndrome. These data suggest that further additional studies with larger groups are warranted to shed further light on these associations.

SESSION III: CLINICAL UPDATES ON PAIN SYNDROMES

Diversity of Pain Syndromes in War Veterans with Posttraumatic Stress Disorder

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Today, clinicians are more aware of the link between Posttraumatic Stress Disorder (PTSD) and physical pain syndromes, which can both be found in traumatized military troops after traumatic events are incurred during military operations. The current formulation of PTSD is based on the notion that dissociated memories of trauma can be expressed as intrusive thoughts, affective states, sensory perceptions and somatoform dissociations, sometimes represented as pain syndromes. It is well known that patients suffering from PTSD (i.e., war veterans) experience a triad of symptoms: intrusive symptoms; emotional numbness with avoidant strategies; and hyperarousal. However, these patients also have physical symptoms – the most common are chronic fatigue and pain syndromes (i.e., chronic headaches, noncardiac chest pain, and unexplained chronic pain in the pelvic region). In this study, we will present three clinical cases of participants in military and war operations and then analyze the various etiological sources of pain syndromes in PTSD, presenting the possibility that painful symptoms or syndromes can be an etiological intrusion or somatoform dissociation during an anniversary reaction. Therefore, these pain syndromes represent a part of the spectrum of posttraumatic reactions that affect military members long after returning from the "battlefield."

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Biofeedback/Neurofeedback Treatment of PTSD War Veterans with Chronic Pain Syndromes: Case Reports

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Chronic pain syndrome is often present within different psychiatric diagnoses and can often induce functional impairment, disability, and psychological distress. One of the most common psychiatric disorders comorbid with pain syndrome is Posttraumatic Stress Disorder (PTSD).

The aim of this paper is to present the biofeedback/neurofeedback (BFB/NFB) treatment of two war veterans with PTSD and chronic pain syndromes (tension headache and lower back pain). Both patients were resistant to the standard prior treatment that was conducted at our department, which consisted of pharmacotherapy, psychotherapy, anxiety management, cognitive behavioral therapy, and psycho-education. Furthermore, the patients were using analgesics and physical therapy to manage chronic pain.

We decided to apply BFB/NFB treatment as an add-on therapy which showed a clinical improvement in pain, anxiety, and depressive symptoms, as well as in overall functioning. Treatment efficacy was confirmed with psychophysiological measures and clinical scales, as well as the patients' subjective reports.

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Death Rescued Him from Pain – A Report of Complex Therapy of an ISAF Polish Soldier with an Extreme Multi-Organ Injury

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This is a case report of a wounded soldier who suffered a multiple organ injury as a result of an Improvised Explosive Device (IED) explosion under his armored personnel carrier. His injuries were extreme. The soldier suffered an amputation of his right lower limb with enucleaction in the hip joint, amputation of his left lower limb in the middle of the thigh, a multi-level backbone injury with spinal cord damage resulting in the dysfunction of sphincters, disorders of peristalsis and a partial limitation of breathing activity, chest injuries resulting in a complete amputation of the left lung and a lower part of the right lung as well as a distress of the middle lung part, an abdominal injury with damage to the fascia and muscles requiring an implantation of a titanium wire mesh across the whole abdomen area, and an injury of the left elbow joint resulting in faulty functioning of this joint.

The injuries suffered by the soldier resulted in a continuous 18-month stay in the hospital. Every day of his hospitalization was a fight with his physical and mental pain. This pain was multiplied by series of orthopedic surgeries of an interventional nature, e.g., removal of the backbone stabilization system due to penetration of the fixing screws through the skin because of emaciation. Pain treatment for this patient was much restricted by his respiratory distress and the rehabilitation activities administered. The patient's death was caused by respiratory distress resulting from pneumonia. He was conscious until the very end.

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Body Pain and PTSD - A Case Report on Psychodermatosis in a Polish Veteran of ISAF

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This paper contains a case report describing a 44-year old career soldier, a veteran of six deployments outside of Poland (Lebanon, Kosovo, twice in Iraq and twice in Afghanistan). During his latest deployment he developed some lesions on his hands and feet in the form of skin cracks and peeling. Fluid was seeping from these areas and they were causing acute pain resulting in a complete inability to perform everyday activities. The patient was treated during his deployment and a slight improvement in symptoms occurred. After returning to Poland he was hospitalized twice in the Department of Dermatology of the Military Institute of Medicine because of worsened skin symptoms (seeping cracks, epidermis exfoliation, finger contractures, and acute pain preventing normal functioning). The diagnosis revealed contact dermatisis. The applied symptomatic treatment resulted in only temporary improvement followed by a recurrence of the symptoms. After a psychiatric consultation a possibility of a psychogenic basis of the lesions was identified. The patient was admitted to the Department of Psychiatry and Combat Stress of the Military Institute of Medicine (DP&CS), where the examination showed a comorbidity of PTSD symptoms and the lesions. An experiment using Virtual Reality (VR) has clearly displayed the occurrence of skin reactions while the patient was exposed to war scenes. The outcome of the medication and individual applied psychotherapy reduced the lesions to a level allowing for normal everyday functioning of the patient and the longest achieved remission of the lesions to-date.

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SESSION IV: TREATMENT OF PAIN SYNDROMES

Global Health Initiatives for Pain and Suffering: Just Mitigate or Eliminate? An Integrative Medicine and Holistic Approach for the Full Pain Spectrum (Physical to Psychological) while Optimizing Human Performance

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The military population is increasingly using complementary and alternative medicine (CAM) therapies to enhance traditional medicine therapies that treat the full spectrum of pain from the psychological to the bio-physiological wounds of war. This presentation will discuss the latest CAM techniques, modalities, and research that can serve as a resource and guidance to comprehensively treat, rehabilitate, and promote recovery and wellness for Service Members, Veterans, and their Families afflicted with pain.

Pain is the most frequent reason patients seek physician care in the U.S., where more than 50 million Americans suffer from chronic pain. In the U.S., chronic pain costs approximately $100 billion a year, which includes health-care expenses, lost productivity, and lost income. Unnecessary suffering is the result of the failure to adequately address pain in the healthcare system. This is depicted in huge financial and personnel costs, and the exacerbation of other medical conditions. No one medical specialty clearly owns, nor can own, pain medicine.

With chronic pain increasing worldwide and traditional medical approaches often ineffective, CAM therapies, along with a deeper understanding of the psycho-neuro-biological system, gives us new insights for treating the pain spectrum from the physical to the psychic along with knowledge of the pattern of neurologic pathways that develop in response to intense pain. The use of medications is appropriate, required, and often an effective way to treat pain. However, the possible overreliance on medications to treat pain has other unintended consequences, including dependency, side effects and potential abuse. For patients interested in treatments other than, or in addition to medication, CAM/Integrative Medicine options are becoming more popular. There is a wide range of therapies and treatments, such as acupuncture, neuro-feedback, hyperbaric medicine, animal, yoga and art therapy, etc., that are proving to be valuable in both reducing an overreliance on medications and eliminating long term pain.

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Integrative Medicine services combine the best of conventional and CAM care that can be applied in both clinical and non-clinical settings. Integrative Health includes a partnership between the patient and practitioner in activating the body's innate healing response. Consideration is given to all factors that influence health, wellness and disease, including the mind, spirit, body and community. Many of the Military Health System's (MHS) challenges with pain management are similar to those found in other medical systems. The MHS also faces some unique issues due to its distinctive mission, structure and patient population. A World Class Healing system for our wounded warriors uses a holistic, multidisciplinary, and multimodal state of the art/science technologies and methodologies approach. With this focus, not only is there a comprehensive pain management strategy for treatment, recovery and reintegration, but also the health, quality of life, and mission performance are enhanced and optimized across all populations within the Armed Forces, Veterans, Civilians, Health Care Providers and their Families.

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Comparing Distraction/Relaxation Modalities with Chronic Pain Patients

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Nearly one-third of U.S. adults suffer from chronic pain (pain lasting more than three months). Estimated costs of healthcare and lost work productivity are in excess of $100,000,000,000 per year according to a 1998 study (American Pain Foundation, 2008). A more recent study showed that low back pain alone has associated costs estimated at $85.9 billion (APF, 2008). Undertreated pain drives up the cost of healthcare.

At this time, most providers treat chronic pain patients with a combination of analgesics and non-drug approaches. For some types of mild to moderate pain, non-drug approaches alone seem to provide sufficient relief (McCaffrey & Pasero, 1999).

Furthermore, the use of cognitive-behavioral techniques, such as mental imagery, is effective in decreasing pain. That is, advances in computer technology have led to the development of Virtual Reality (VR). VR encompasses a myriad of computer-generated environments in which participants can immerse themselves. Diverting awareness to alternate stimuli (the virtual worlds) may help distract patients from somatic pain signals.

The main objective of this study is to determine if VR enhances the effectiveness of traditional somatic body imagery techniques to alter the perception of chronic pain (Figure 1).

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Risk Assessment for Emergency Situations

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Human health risk control evaluates the quantitative and qualitative characteristics of human health, either at peace or at war, in order to highlight the risk to human health (mental and physical pain syndromes) due to the potential presence, presence, or use of psychological factors, specific pollutants, weapons, etc. Risk is a combination of the probability of an occurrence of such physical pain syndromes and the possible extent of that event's adverse effects and consequences, in terms of adverse effects on humans resulting in injury. A risk assessment should be conducted by adopting a systematic approach, where it is determined that a management action may have consequences on the state of human health.

The process for human health risk assessment involves the following steps:

• Hazard identification – the determination of whether a particular psychological or mental factor is causally linked to a particular health effect in people serving in active duty and in post-deployment;

• dose-response assessment – the determination of the relationship between the magnitude of the exposure and the probability of the occurrence of health effects;

• exposure assessment – determination of the extent of exposure; and

• risk characterization – description of the nature and often the magnitude of risk including attendant uncertainty.

Risk characterization serves to organize the information gained through the actions of identifying and reducing risks. It should also contain a description and estimate of the uncertainty of the assessment. A useful comparison could be related to risks that could result from alternative war technologies, sites or projects.

Risk assessment comprises of the following steps: hazard identification, consequence analysis, quantitative analysis and frequency assessment.

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Stress Prevention May Reduce Pain: Concepts and Programs of Prevention in the German Armed Forces

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Psychological health and resilience are indispensable requirements for military personnel serving in combat zones. Their importance is even greater because of their close relationship to the experience of pain.

An example is shown by a German NCO who suffered from chronic dental pain for three years after deployment, and whose pain ceased after undergoing psychotrauma therapy.

Differentiated prevention programs are becoming more and more important to protect troops, not only from Post-traumatic Stress Disorder, but also from depression, anxiety disorders, and pain syndromes.

Prevention programs in the German Armed Forces follow a "Framework Regulation for Coping with Psychological Stress of Servicemen." The concept defines measures on a three phase and three level basis. The three phases include pre-deployment preparation, deployment itself, and post-deployment measures.

Right now the framework regulation is being further developed, and the focus is shifting from psychological stress to psychological fitness (PF). PF needs to be defined and operationalized by its components. The practical implementation includes a computer-based training program in the pre-deployment training phase. Regular screening measures will monitor the PF of troops and regulate an individualized combination of post-deployment modules to strengthen personal resources. These components of primary and secondary prevention also include elements to reduce the basis for mental and physical pain.

The concepts and their relation to pain will be presented and discussed.

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Chronic Lower Back Pain in Chronic Combat-Related Posttraumatic Stress Disorder

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Recent research suggests that chronic Posttraumatic Stress Disorder (PTSD) and chronic lower back pain frequently co-occur and that similar mechanisms may exist for treating both conditions. We examined the relationship between PTSD symptoms and chronic lower back pain in 406 Croatian war veterans. On the basis of medical records, interviews and different self-reported questionnaires we analyzed the relationship between chronic lower back pain and chronic PTSD. Our results have shown that chronic PTSD may be associated with greater pain perception in war veterans. There is a need for a multidisciplinary approach in the treatment of patients with chronic PTSD and comorbid chronic lower back pain in order to optimize treatment that would result in more cost-effective care. Today, in the treatment of chronic pain and chronic PTSD, the focus is on so-called "rational polypharmacy." The authors would like to present their clinical experience in the treatment of patients with chronic lower back pain and chronic PTSD.

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