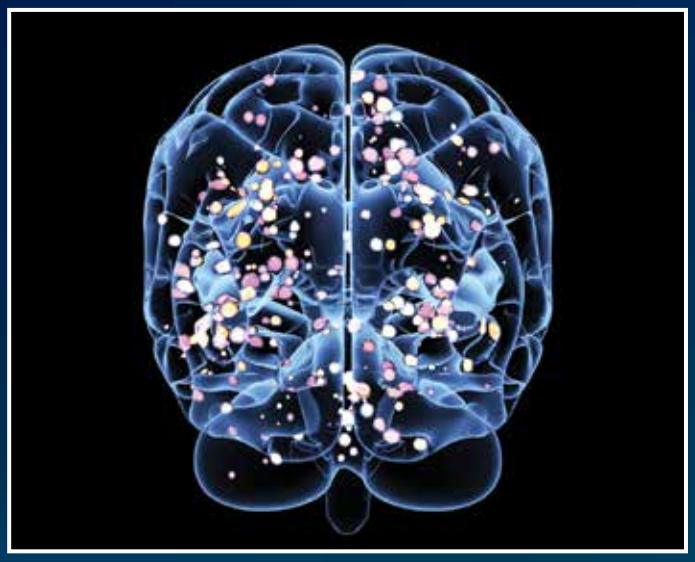
UNIFORMED SERVICES UNIVERSITY

Center for the Study of Traumatic Stress

PROGRAM
15th Annual Amygdala, Stress, and PTSD Conference: Stress and the Mind

APRIL 21, 2020

Sanford Auditorium & Lobby, Building B
Uniformed Services University, Bethesda, MD



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The Amgydala, Stress, and PTSD Conference at the Uniformed Services University brings together scientists and clinicians working towards solving the biological basis of stress, fear, and posttraumatic stress disorder.

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The Center for the Study of Traumatic Stress (USU), Department of Psychiatry (USU), Neuroscience Program (USU), Department of Family Medicine (USU), and Department of Psychiatry (WRNMMC)

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Background

The Center for the Study of Traumatic Stress (CSTS) of the Uniformed Services University (USU), in collaboration with the USU Department of Psychiatry, USU Neuroscience Program, USU Department of Family Medicine, and the Walter Reed National Military Medical Center (WRNMMC), Department of Psychiatry, is pleased to present the *15th Annual Amygdala, Stress, and PTSD Conference: Stress and the Mind.*

The Amygdala, Stress, and PTSD Conference at the Uniformed Services University brings together scientists and clinicians working towards solving the biological basis of stress, fear, and posttraumatic stress disorder.

Table of Contents

AGENDA

0900-0900	Registration and Poster Review
0900-09:05	Conference Announcements — **Derrick A. Hamaoka, MD**
0905-0915	Welcome and Introduction — **Robert J. Ursano, MD**
0915-1000	*Neural Circuits Mechanisms of Emotion and Social Processing* — **Kay M. Tye, PhD**
1000-1045	*Transcriptional and Epigenetic Basis of Stress Effects on the Brain* — **Eric J. Nestler, MD, PhD**
1045-1115	Coffee Break and Poster Review in Lobby
1115-1145	Discussion Panel 1 — Moderator — **David Johnson, COL, USA, MC**
1145-1245	Lunch
1245-1330	*Evidence Based Treatment for PTSD: Where are We and Where Do We Need to Go Into the Future* — **David Forbes, PhD**
1330-1415	*iCover: A Team-Based Intervention for Acute Stress Reaction in Combat* — **LTC Vincent F. Capaldi, II, MC, USA**
1415-1445	Coffee Break and Poster Review in Lobby
1445-1530	*Individualized Resting-State fMRI-Guided Transcranial Magnetic Stimulation Treatment for Depressive Symptoms in Military Traumatic Brain Injury Patients* — **David Brody, MD, PhD**
1530-1600	Discussion Panel 2 — Moderator — **John M. Burger, LCDR, MC, USN**
1600-1615	Closing Remarks and Presentation of Travel Award — **Robert J. Ursano, MD**

Conference Speakers

David Brody, MD, PhD

David L. Brody, MD, PhD, is the Director of the Center for Neuroscience and Regenerative Medicine (CNRM) and a Professor of Neurology within the Uniformed Services University of the Health Sciences (USU) in Bethesda, Maryland. He is a board-certified neurologist with both a research and a clinical specialization in traumatic brain injury (TBI) and neurodegenerative diseases. His research focuses on accelerating better outcomes for U.S. military TBI patients.

Prior to his current position, Dr. Brody was the Norman J. Stupp Professor of Neurology at the Washington University School of Medicine in St. Louis, Missouri. Dr. Brody was also the Washington University site director for the National Football League's Neurological Care Foundation.

He has developed and authenticated advanced imaging technologies to detect injury in the brain's white matter and showed, for the first time, how to predict neurological function by measuring amyloid, an abnormal protein in the brain. He also helped discover that diffusion tensor imaging, an advanced magnetic resonance imaging technique, can reveal blast- related damage.

Dr. Brody previously led a team that worked in partnership with U.S. Department of Defense (DoD) researchers at the Landstuhl Regional Medical Center in Germany and at two sites in Afghanistan, treating U.S. military personnel with TBIs. In 2011, he served as a consultant to the medical advisor of the Chairman of the Joint Chiefs of Staff. He traveled to Afghanistan at the request of then-JCS Admiral Michael Mullen with the "Gray Team", a group of civilian and military experts evaluating the status of TBIs in troops within the combat zone.

His achievements have been recognized with several awards, including a Career Development Award from the National Institute of Neurological Disorders and Stroke, and a Burroughs Wellcome Career Award in the Biomedical Sciences. Dr. Brody is a member of the Editorial Board of the Journal of Neurotrauma and Acta Neuropathologica and a permanent member of the National Institute of Health Acute Neural Injury and Epilepsy Study Section. His clinical monograph entitled "Concussion Care Manual: A Practical Guide" was published by Oxford University Press in 2014.

Conference Speakers. Continued

LTC Vincent F. Capaldi, II, MC, USA

LTC Vincent F. Capaldi, II, MC, USA, is the Chief of the Department of Behavioral Biology, Center for Military Psychiatry and Neuroscience Research, at the Walter Reed Army Institute of Research in Silver Spring, MD. He currently serves as an associate professor in the departments of Internal Medicine and Psychiatry at the Uniformed Services University of the Health Sciences in Bethesda, MD. He is also the program director of the National Capital Consortium combined Internal Medicine and Psychiatry residency training program and chair of the Biomedical Ethics Committee at Walter Reed National Military Medical Center.

LTC Capaldi completed dual residency training in Internal Medicine and Psychiatry and fellowship in Sleep Medicine at Walter Reed National Military Medical Center. LTC Capaldi holds board certifications from the American Board of Psychiatry and Neurology and the American Board of Internal Medicine to practice General Psychiatry, Internal Medicine, and Sleep Medicine.

In 2013, LTC Capaldi was elected as a Fellow of the American Psychiatric Association and the American College of Physicians and currently served as president of the Society of Uniformed Services Psychiatrists (2017–2018).

In January 2013, LTC Capaldi was appointed as officer in charge (OIC) of the Restoration Program at Bagram Air Field, Afghanistan. As OIC, LTC Capaldi was responsible for the comprehensive behavioral health restoration program, all clinical operations, and prevention activities for over 45,000 NATO troops stationed across Afghanistan. In January 2019, LTC Capaldi deployed to Iraq in support of Operation Inherent Resolve, serving as the Theater Behavioral Health Consultant, the senior behavioral health provider supporting service members in Kuwait, Iraq, Syria, and Jordan. LTC Capaldi is credited with establishing the behavioral health hotline in the CENTCOM region.

LTC Capaldi has published over 40 peer reviewed scientific articles and book chapters on various topics such as sleep disorders, traumatic brain injury, and post stroke depression that have appeared in several medical journals. He serves as the Psychiatry & Clinical Psychology Disorders Capabilities Manager and Steering Committee Chair for Physiological Health and Performance in the Military Operational Research Program, Medical Research and Development Command. He also serves as the Sleep Medicine Consultant to the US Army Surgeon General.

Conference Speakers. Continued

David Forbes, PhD

David Forbes is the Director of Phoenix Australia – Centre for Posttraumatic Mental Health and Professor in the Department of Psychiatry, University of Melbourne.

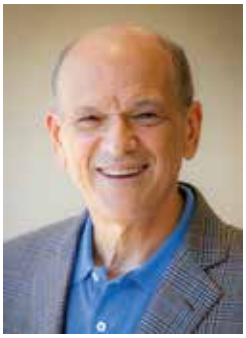
He has over twenty-five years' experience in the assessment and treatment of mental health problems in trauma survivors, with a speciality in military, veteran, and emergency services mental health.

He led the development of the Australian Guidelines for the Treatment of Posttraumatic Stress Disorder (PTSD) approved by the National Health and Medical Research Council and is Vice Chair of the International (ISTSS) PTSD Guidelines.

He has a strong track record in the conduct of research across the lifespan the provision of policy and service development advice to government and agencies responsible for the care of those occupationally exposed to trauma and the provision of training in evidence based treatments for PTSD and related disorders.

He has published over 160 scientific papers in the international literature and sits on many Commonwealth government policy and scientific advisory panels and academic journal editorial boards

Eric J. Nestler, MD, PhD



Dr. Nestler is the Nash Family Professor of Neuroscience at the Icahn School of Medicine at Mount Sinai in New York, where he serves as Dean for Academic and Scientific Affairs and Director of the Friedman Brain Institute. He received his B.A., Ph.D., and M.D. degrees, and psychiatry residency training, from Yale University. He served on the Yale faculty from 1987–2000, where he was the Elizabeth Mears and House Jameson Professor of Psychiatry, Pharmacology, and Neurobiology, and Director of the Division of Molecular Psychiatry. He moved to Dallas in 2000, where he was the Lou and Ellen McGinley Distinguished Professor and Chair of the Department of Psychiatry at The University of Texas Southwestern Medical Center, until moving to New York in 2008.

Dr. Nestler is a member of National Academy of Medicine (1998) and a Fellow of the American Academy of Arts and Sciences (2005). He is a past President of the American College of Neuropsychopharmacology (2011) and the Society for Neuroscience (2017). He is a founder and scientific advisory board chair for PsychoGenics, and a member of the Board of Directors of Berg Pharma. The author of more than 600 publications and five books, the goal of Dr. Nestler's research is to better understand the molecular basis of drug addiction and depression. His research uses animal models of these disorders to identify the ways in which drugs of abuse or stress change the brain to lead to addiction- or depression-like syndromes, and to use this information to develop improved treatments of these disorders.

Conference Speakers. Continued

Kay M. Tye, PhD

Kay M. Tye is a Professor and Wylie Vale Chair of the Systems Neuroscience Laboratory at the Salk Institute for Biological Sciences, and an adjunct faculty member at the University of California, San Diego (UCSD). Her research program is focused on understanding the neurobiological mechanisms underlying social and emotional processes at the circuit, cellular and synaptic levels, particularly those relevant to psychiatric disease.

Professor Tye was born in Ithaca, New York on July 27, 1981 and graduated from Ithaca High School in 1999. Her professional training began at the Massachusetts Institute of Technology (MIT) where she graduated with a major in Brain and Cognitive Sciences in 2003. After taking a year off to travel, she earned her PhD at the University of California, San Francisco (UCSF) in 2008, and trained as a postdoctoral fellow at Stanford University from 2009–2011. She then became an Assistant Professor at MIT in 2012, and was promoted to Associate Professor with Tenure in 2018. She then moved her laboratory to the Salk Institute in 2019.

Professor Tye has been recognized with a number of prestigious research awards including the NIH Director's New Innovator Award, the Presidential Early Career Award for Scientists and Engineers, the Society for Neuroscience Young Investigator Award, Technology Review's Top 35 Innovators under thirty-five, and the NIH Director's Pioneer Award. She has also been recognized with a number of awards for mentoring at the undergraduate, graduate and postdoctoral level. She is committed to outreach, promoting diversity and inclusion in science, and parenting her two children along with her spouse, Jim Wagner.

Moderators

John M. Burger, LCDR, MC, USN

A native of Oklahoma City, Oklahoma, Lieutenant Commander Burger graduated in 2005 from the United States Naval Academy in Annapolis, Maryland. After receiving his M.D. degree from the Uniformed Services University of the Health Sciences, Lieutenant Commander Burger completed his internship and residency in psychiatry, both at the Naval Medical Center in San Diego, California. Upon completion of his residency, Lieutenant Commander Burger was assigned to the 1st Marine Regiment, Camp Pendleton, California where he served as the Officer-in-Charge for the Operational Stress Control and Readiness Team.

In 2016, Lieutenant Commander Burger received orders to Naval Hospital Camp Pendleton where he served as Senior Medical Officer and Mental Health Department Head for the Directorate of Mental Health. In 2018, Lieutenant Commander Burger deployed in support of JTF GTMO as the Behavioral Health Unit Officer-in-Charge, as well as being selected to provide regular ethics briefs to all staff and as the medical spokesman for media and dignitary visits, including a CODEL, NBC, Reuters, Military Times, and over 30 admirals and generals. In the summer of 2019, he arrived at Walter Reed National Military Medical Center where he is the Associate Program Director for the military's National Capital Consortium's Psychiatry Residency responsible for educating and training 53 psychiatry residents, both from the Army and Navy.

Lieutenant Commander Burger's awards include the Navy/Marine Corps Commendation Medal (four awards), Meritorious Unit Commendation, National Defense Service Medal, Global War on Terrorism Service Medal, Rifle Markmanship Medal (sharpshooter), and Pistol Markmanship Medal (expert). Lieutenant Commander Burger, his wife, and four children live in Bethesda, MD.

David Johnson, COL, USA, MC

COL David Johnson serves as the subject matter expert (SME) in Forensic Psychiatry for the Army, serving as forensic psychiatry consultant to the Army Office of the Surgeon General and serves as Chief of the Center for Forensic Behavioral Sciences (CFBS) at Walter Reed National Military Medical Center (WRNMMC). CFBS serves as the only dedicated facility for forensic psychiatry and forensic psychology within the Department of Defense, offering forensic consultation to courts-martial worldwide for DoD and the Coast Guard as well as to federal and military law enforcement and intelligence operations. His work at CFBS began in June 2012, when he served as the Program Director for the National Capital Consortium Forensic Psychiatry Fellowship training program until June 2018. During that period, he was responsible for the training of all Army and Navy forensic psychiatrists.

COL Johnson earned two degrees at the University of California at Berkeley in Molecular Cell Biology and Physical Anthropology in 1996. COL Johnson completed medical school at the Uniformed Services University (USU) in 2000, completed General Psychiatry residency at the old Walter Reed in 2004, and completed forensic psychiatry fellowship training there in 2005. His first duty assignment was as Division Psychiatrist for the 1st Infantry Division in Wuerzburg, Germany. He led all Behavioral Health operations in support of Schweinfurt, Germany from 2006 to 2010, supporting the 172nd Infantry Brigade. He led Behavioral Health operations for Weed Army Community Hospital at the National Training Center (NTC) in Fort Irwin, California from 2010–2012. He deployed in support of both Operation Iraqi Freedom and Operation Enduring Freedom in support of warfighting efforts, and has travelled on separate short-term missions to both theaters as well.

David Johnson COL, USA, MC, Continued

COL Johnson has performed services for over 200 courts-martial, from R.C.M. 706 evaluations to expert testimony. He served as medical/psychiatric SME for the 15-6 investigation into the Fort Hood mass shooting of 2014 by SPC Ivan Lopez. COL Johnson has supported military commissions by conducting court-ordered evaluations on detainees involved with the U.S.S. Cole bombing and the 9/11 attacks. He has given numerous presentations at national and Judge Advocate General (JAG) conferences on military sexual assault, the military disability process, and other forensic topics. He has co-authored chapters for multiple textbooks and is a co-author of a significant paper regarding the use of military unit watches for potentially suicidal or homicidal service members.

COL Johnson's military awards include the Bronze Star, the Meritorious Service Medal (1 OLC), the Joint Service Commendation Medal, the Army Commendation Medal, the Joint Service Achievement Medal, and the Army Achievement Medal (2 OLC). He is a member of the Order of Military Medical Merit, holds the Army's Proficiency "A" Designator, and holds Master Clinician status at WRNMMC.

Conference Leadership

Derrick A. Hamaoka, MD

Col (Dr.) Derrick Hamaoka serves as the Assistant Chair, Medical Education, for the Uniformed Services University of the Health Sciences Department of Psychiatry. Col Hamaoka is a graduate of the Uniformed Services University of the Health Sciences School of Medicine (1999) and the University of Texas Health Science Center Psychiatry Residency Program (2003). Prior to serving in his current position, he was the Associate Program Director, University of Texas Health San Antonio Psychiatry Residency Program, leading one of the largest programs in the nation and responsible for the majority of the active duty Air Force psychiatry pipeline. He holds the Air Force Medical Corps Academic Grand Master (ME) Special Experience Identifier (SEI). He also serves as the Defense Institute for Medical Operations director and subject matter expert for the Mental Health Services After Disasters & Combat course, providing support/education for recent missions to Iraq, Sierra Leone, Tunisia, Colombia, Mexico, and Slovakia.

Robert J. Ursano, MD

Dr. Ursano is Professor of Psychiatry and Neuroscience and Chairman of the Department of Psychiatry at the Uniformed Services University of the Health Sciences, Bethesda, Maryland. He is founding Director of the Center for the Study of Traumatic Stress. In addition, Dr. Ursano is Editor of Psychiatry, the distinguished journal of interpersonal and biological processes, founded by Harry Stack Sullivan. Dr Ursano completed twenty years service in USAF medical corps and retired as Colonel in 1991. He was educated at the University of Notre Dame and Yale University School of Medicine and did his psychiatric training at Wilford Hall USAF Medical Center and Yale University.

Dr. Ursano served as the Department of Defense representative to the National Advisory Mental Health Council of the National Institutes of Mental Health and is a past member of the Veterans Affairs Mental Health Study Section and the National Institute of Mental Health Rapid Trauma and Disaster Grant Review Section. He is a Distinguished Life Fellow in the American Psychiatric Association and a Fellow of the American College of Psychiatrists. Dr. Ursano was the first Chairman of the American Psychiatric Association's Committee on Psychiatric Dimensions of Disaster. This work greatly aided the integration of psychiatry and public health in times of disaster and terrorism. Dr. Ursano was an invited participant to the White House Mental Health Conference in 1999. He has received the Department of Defense Humanitarian Service Award and the highest award of the International Traumatic Stress Society, The Lifetime Achievement Award, for "outstanding and fundamental contributions to understanding

Robert J. Ursano, MD, Continued

traumatic stress." He is the recipient of the William C. Porter Award from the Association of Military Surgeons of the United States, the William Menninger Award of the American College of Physicians and the James Leonard Award of the Uniformed Services University. He is a frequent advisor on issues surrounding psychological response to trauma to the highest levels of the US Government and specifically to the Department of Defense leadership.

Dr. Ursano has served as a frequent member of the National Academies of Science, Institute of Medicine Committees and working groups including the Committee on Psychological Responses to Terrorism, Committee on PTSD, the Committee on Compensation for PTSD in Veterans and the Committee on Nuclear Preparedness; and the National Institute of Mental Health Task Force on Mental Health Surveillance After Terrorist Attack. In addition, he has served as a member of scientific advisory boards to the Secretary of Health and Human Services for disaster mental health and the Centers for Disease Control for preparedness and terrorism. Dr. Ursano is co-principal investigator of the largest NIMH grant ever given for the study of Suicide in the U.S. Army. In collaboration with his co-principal investigators at Harvard University, the University of Michigan and Columbia University the Army- STARRS grant will be the Framingham Study of suicidal behavior, and address a national as well as DoD mental health need. In 2014, Dr. Ursano and Dr. Matthew Friedman of the VA National Center for PTSD co-founded the Friedman-Leahy Brain Bank supported through Senator Patrick Leahy (D-VT). It is the first human brain bank dedicated to PTSD. This joint effort of many people was a 12 year project developing concepts, pilot data and support. Dr. Ursano has over 300 publications. He is co-author or editor of eight books.

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Thank you to the Henry M. Jackson Foundation for their kind support for the reception.

Conference Posters

Presented in the Lobby

Continued

Impact of the Previous Night's Sleep Disturbances on Post Traumatic Stress Symptoms among Individuals With and Without PTSD

Authors

Quinn M. Biggs, Ph.D., M.P.H.,[1] Robert J. Ursano, M.D.,[1] Jing Wang, Ph.D.,[1] Gary H. Wynn, M.D.,[1] David S. Krantz, Ph.D.,[1] Russell B. Carr, M.D.,[1,2] Nicole M. Dacuyan, B.S.,[1] Katherine Pokorny, B.A.,[1] Ametisse Gover-Chamlou, B.A.,[1] Samantha Martinez, B.A.,[1] and Carol S. Fullerton, Ph.D.[1]

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ABSTRACT

Background: Sleep problems and Post Traumatic Stress Disorder (PTSD) are highly related, but it is not known whether sleep problems affect Post Traumatic Stress Symptoms (PTSS) on a daily basis. This study examined the relationship between the previous night's sleep disturbances and the following day's PTSS among individuals with and without PTSD.

Methods: Current and former U.S. service members ($N = 80$) were assessed for probable PTSD at enrollment. PTSS were assessed four times daily and sleep disturbances were assessed once daily by self-report for 15 days using an ecological momentary assessment methodology. Eighteen items from the PTSD Checklist for DSM-5 were used to measure PTSS. Nine items from the Pittsburgh Sleep Quality Index (PSQI) were adapted to measure sleep disturbances. Linear mixed models with control for demographic characteristics were applied to examine the association between sleep disturbances and PTSS. An interaction of sleep disturbances by PTSD group tested whether the association differed between individuals with and without PTSD.

Results: There was a significant interaction of previous night's sleep disturbances and PTSD group. In both groups, sleep disturbances were positively associated with PTSS. Among individuals with probable PTSD ($n = 42$), one more sleep disturbance during the previous night was associated with a 3.75 increase in PTSS the following day ($p < .001$). Among individuals without probable PTSD ($n = 38$), one more sleep disturbance during previous night was associated with a 1.65 increase in PTSS the following day ($p = .001$).

Conclusions: These first preliminary findings indicate that sleep disturbances affect next day PTSS and the influence is stronger for individuals with PTSD. Behavioral interventions to ameliorate sleep disturbances may reduce the daily burden of PTSD symptoms for individuals with PTSD.

Keywords: post traumatic stress disorder, sleep disturbances, symptom assessment, ecological momentary assessment, military personnel

Incidence Rates of Posttraumatic Stress Disorder in the US Military (2007-2015): Trends Across Military-Specific Variables

Authors

Jeffrey Cook, PhD ([1,2]); Maegan M. Paxton, BS ([1]); Jennifer Phillips, PhD ([1,2]); Avni Patel , MPH ([1]); Lisa French, PsyD ([2]); David S. Riggs, PhD ([1,2]); Tracey Koehlmoos, PhD ([1])

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2. Center for Deployment Psychology

ABSTRACT

Background: Providing effective support and treatment for Posttraumatic Stress Disorder (PTSD) is a priority of the Department of Defense. Thus, it is critical to know how rates of PTSD differ across military-specific variables, including component (Active Duty [AD] or Reserve Component [RC]), branch of service, and rank. However, current estimates of PTSD in the US military vary widely dependent on the sample and study methodology.

Methods: This study examined the rates of initial diagnoses of PTSD across these variables in the US Military between 2007 and 2015. Data, consisting of direct care inpatient and outpatient records for AD and RC military were accessed via the Military Health System Data Repository. ICD-9 codes for the initial diagnosis of PTSD were identified and rates calculated based on counts from the Defense Enrollment Eligibility Reporting System (DEERS).

Results: During the study period, rates of initial PTSD diagnosis were higher for AD members, with both AD and RC rates peaking in 2012 before declining through 2015. Rates were consistently highest for the Army, followed by the Marines, lowest for the Coast Guard, and intermediate for Navy and Air Force. Enlisted personnel had higher rates of PTSD than officers, and PTSD rates were inversely related to rank in both the Enlisted and Officer categories.

Conclusions: The present results provide a population analysis of the incidence rates of PTSD within the Military Health System. These findings highlight subgroups within the military with higher rates of PTSD diagnosis, which can enable DoD to tailor prevention and treatment interventions for these groups.

Risk and Resilience of Lifetime Stressful Experiences among U.S. Army Soldiers at Risk for Suicide

Authors

Catherine L. Dempsey[1], Ph.D., David M. Benedek[1], MD., Kelly Zuromski[2], Ph.D., Matthew K. Nock[2], Ph.D., Tsz Hin Ng[1], MPH., Charlotte Riggs[1], MS., Catherine Broshek[1], BA., Samantha Martinez[1], BA., and Robert J. Ursano[1], MD.

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2. Department of Psychology, Harvard University.

ABSTRACT

Background/ Objectives. The purpose of this study is to identify the extent to which the presence of lifetime stressful events (military/deployment-related and family/social-related) are risk factors for suicide among US Army Soldiers as reported by third parties.

Methods. The data are from a psychological autopsy study conducted as part of the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS**). Data were gathered from next of kin (NOK) and Army supervisors (SUP) using structured interviews. Propensity-matched controls were matched on known sociodemographic risk factors for suicide and Army history variables. Associations were examined using multivariate logistic regression.

Results. The odds of suicide were higher for those Soldiers who experienced lifetime interpersonal violence (sexual assault or rape) compared to propensity-matched controls as reported by SUP (OR =8.6 [95% CI= 1.1, 65.3]) and NOK (OR=4.2 [95% CI = 1.5, 11.5]). NOK reported exposure to the suicide of a close friend or relative NOK (OR=3.0 [95% CI = 1.5, 0.2]) as a risk factor for suicide. Interestingly, NOK and SUP reported service members who experienced a disaster were less likely to die by suicide compared to propensity-matched controls NOK (OR =0.2 [95% CI =0.1, 0.9]) and SUP (OR = 0.2 [95% CI = 0.0, 0.6]). SUP reports also demonstrated the protective effects of saving the life of a Soldier or civilian during deployment (SUP OR = 0.3 [95% CI = 0.1, 0.7]).

Conclusions. This study identified interpersonal violence and suicide of a close friend or relative were associated with increased odds of suicide death. Results suggest that exposure to disaster and saving the life of a Soldier or civilian, and the ability to handle stress may be protective of suicide. Our findings may assist both supervisors and family members in identifying those most at risk and inform preventive intervention efforts.

** Army STARRS was sponsored by the Department of the Army and funded under cooperative agreement number U01MH087981 with the U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Mental Health (NIH/NIMH). The contents are solely the responsibility of the authors and do not necessarily represent the views of the Department of Health and Human Services, NIMH, Department of the Army, Department of Defense, Uniformed Services University of the Health Sciences, or Center for the Study of Traumatic Stress.

Inflammatory Cytokines and Cardiovascular Disease are Associated with Neuroimaging Findings after Acute Mild Traumatic Brain Injury

Authors

Katie A Edwards, PhD, RN[1,2]; Cassandra L Pattinson, PhD[1]; Vivian Guedes, PhD,[1]; Jordan Peyer, BS[1]; Chen Lai, PhD[1]; Christina Devoto, MS[1,2]; Lawrence Latour, PhD[1]; Jessica M Gill, PhD, RN[1]

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2. Henry M. Jackson Foundation for the Advancement of Military Medicine, Bethesda, MD.

ABSTRACT

Background/Objectives: Identification of peripheral blood biomarkers related to mild traumatic brain injury (mTBI) that inform neuroimaging may be a safe, cost-effective method to identify individuals with intracranial injury. Previous data shows blood biomarkers discriminate mTBI subjects with/without magnetic resonance imaging (MRI) abnormalities (tau, NFL, GFAP), and with/without computed tomography (CT) findings (GFAP). In this study, we analyzed the relationship between peripheral blood levels of cytokines IL-6, IL-10, TNF-alpha, and VEGF and neuroimaging results following acute mTBI (<48 hours). Increased acute levels of circulating cytokines (IL-6, IL-10, VEGF, TNF-alpha) have been linked to worse clinical outcomes after moderate and severe TBIs. In addition, epidemiological, clinical, and preclinical studies have linked chronic inflammation and immune system activation to cardiovascular disease (CVD) pathogenesis. Associations between neuroimaging, CVD, and levels of IL-6, IL-10, TNF-alpha, and VEGF in mTBI are unknown.

Methods: Participants presented to the emergency department with suspected mTBI (n=341) and underwent blood draw, CT, and MRI. Subjects were categorized into three neuroimaging groups: CT positive (n=94); MRI-only positive (n=112); control (negative neuroimaging, n=135). IL-6, IL-10, TNF-alpha, and VEGF plasma concentrations were measured using single-molecule array (SIMOA). We evaluated whether cytokine levels and/or CVD can predict specific neuroimaging groups.

Results: Neuroimaging outcomes were significantly associated to CVD histories of hyperlipidemia ($p<0.001$) and hypertension ($p=0.005$); neuroimaging outcomes were significantly associated to increased concentrations of IL-6 and VEGF (p's<0.001). As such, these variables were put into a regression model. Results indicate hyperlipidemia and hypertension were not significant predictors, but IL-6 and VEGF differentiated patients with and without MRI abnormalities, with IL-6 being the strongest predictor (p's<0.001).

Conclusions: Results suggest IL-6 and VEGF as promising markers of brain injury in patients with acute mTBI, and may differentiate those with CVD history. A multi-biomarker approach, including blood-based biomarkers and patient CVD history, may facilitate neuroimaging and clinical decision making.

Elevated Tau Relates to Persistent PTSD, Depression and Post-Concussive Symptoms in Military Personnel with History of Traumatic Brain Injury

Authors

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ABSTRACT

Background/Objectives: Posttraumatic stress disorder (PTSD), depression, and post-concussive syndrome (PCS) are highly prevalent in military populations and frequently occur comorbidly with traumatic brain injury (TBI), resulting in substantial health risks. Elucidating the biological variances that are associated with TBIs featuring comorbid chronic PTSD and PCS may ultimately enable the identification of the mechanisms that underlie these symptoms in military personnel to improve care and inform novel interventions. Tau, amyloid-beta (Aβ), and neurofilament light chain (NFL) have been associated with TBI-related pathological mechanisms. However, the relationship between biomarkers and behavioral alterations after TBIs remains to be understood. This study examined associations among TBI, blood biomarkers and symptoms of PTSD, depression, and PCS.

Methods: PTSD, depression and PCS were evaluated using PTSD checklist-civilian version (PCL), patient health questionnaire-9 (PHQ-9), and neurobehavioral symptom inventory (NSI), respectively, in military personnel (n = 109) with or without chronic TBI. Serum concentrations of tau, Aβ40, Aβ42, and NFL were measured using an ultra-sensitive assay.

Results: The TBI group reported significantly worse PTSD, depression, and post-concussive symptoms than the control group (no TBI). Within the TBI group, controlling for age, sex, time since last injury and anti-anxiety/depression medication use, Tau was positively correlated with PHQ ($p = .01$) and NSI ($p = .008$) total scores. Tau was also correlated with the subscales of NSI-somatosensory ($p < .001$), and PCL-negative mood ($p = .047$). NFL was correlated with PCL-hyperarousal ($p = .017$). However, Aβ40 and Aβ42A were not significantly correlated with the symptoms measured.

Conclusions: Our findings indicate that tau and NFL may play a role in maintenance of psychological symptoms in those who have experienced TBI. Furthermore, there is a critical need for studies of biomarkers longitudinally following TBI.

Prevalence of Medical Conditions and Healthcare Utilization in Treatment-Seeking, Bereaved Military Widows: A Prospective, Case-Controlled, Longitudinal Study

Authors

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ABSTRACT

Background: Spousal bereavement is associated with physical and mental health consequences, however, little is known about the specific impact of military bereavement. Due to their typically younger age at bereavement and likelihood of being impacted by sudden and violent deaths, military widows may be especially vulnerable to negative health outcomes.

Method: Using outpatient medical records from wives of active duty military service members (SMs), we compared prevalences of medical diagnoses and frequency of healthcare visits among treatment-seeking military widow cases (n=1375) and matched (on age, baseline healthcare utilization, SM deployment and rank), time-yoked control military wives (n=1375), from one year prior (Yr-1) to two years following (Yr+1 and Yr+2) SM death. Prevalence risk ratios and confidence intervals were used to compare medical condition prevalence rates and outpatient healthcare visits between cases and controls across each time period.

Results: Compared to controls, prevalences of ill-defined conditions and mental health conditions (MHCs) increased among cases from Yr-1 to Yr+1 as well as from Yr-1 to Yr+2. Physical and mental healthcare visits generally increased for both cases and controls throughout the study period; however, in Yr+2, widow cases accrued greater numbers of physical healthcare visits as compared to controls. Mental health visits also increased following SM death in Yr+1 and Yr+2 among widows.

Conclusions: The increase in ill-defined physical health conditions among widows in the early years following SM death suggests bereavement may be manifested via somatic symptoms, corroborating other recent research indicating military spouses often manifest somatic indicators of stress (Steenkamp et al., 2018). The combination of increases in physical health conditions, MHCs and healthcare utilization among widows highlights the need for improved access to healthcare services that are prepared to adequately treat grief-related conditions.

The Impact of Child Health on Parental PTSD

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ABSTRACT
Background/Objective: Research indicates parenthood increased veterans' likelihood of PTSD care. Results cannot determine if parenthood increases risk or increases motivation for treatment. We sought to examine the impact a child's mental health condition on parental treatment for PTSD after controlling for deployment related variables.

Methods: Utilizing the Military Healthcare System (MHS) database we identified parents injured 2002-16, with a child/children aged 2-16 at time of injury. Parental inclusion in the Ill, Injured, and Wounded Warrior dataset identified service members diagnosed with PTSD and other injures. Parental records included total pre-injury deployment, battle injuries, and number of injuries. ICD-9 codes identified outpatient child mental healthcare for two years preceding injury. Family data identified number of children, and age of youngest child. Logistic regression determined odds of PTSD diagnosis and treatment by child mental health diagnosis, controlling for family and military factors.

Results: There were 234,911 injured parent with 1 or more injury; 1,312 (0.56%) were battle injured, parents were deployed a man of 1.38 years, and had a median of 1.1 injures not including PTSD. There were a median of 1.8 children per family and the median youngest age was 6.2 years. In unadjusted and adjusted analysis parents of a child with a mental health diagnosis were 7% (OR 1.07 [95% CI 1.04-1.10]) more likely to have diagnosed PTSD. Odds of parental PTSD were also increased with each additional child (2%), total pre-injury deployment years (37%), number of injuries (351%), and sustaining a battle injury (196%), odds of PTSD decreased with age of the youngest child (2%).

Conclusion: Odds of PTSD diagnosis was increased in injured parents of children with mental health diagnoses. Results may relate to underlying family risk, or suggest family stress exacerbates PTSD risk. Results suggest providing preventative and family focused care may ameliorate some PTSD risk.

Odds of PTSD in Injured Parents

	Unadjusted Odds of PTSD OR [95% CI]	Adjusted Odds of PTSD OR [95% CI]
Child with Mental Health Diagnosis	1.07 [1.04-1.10]	1.07 [1.04-1.10]
Pre-Injury Deployment Length in Years	1.39 [1.38-1.41]	1.37 [1.36-1.39]
Each Additional Child in Family	1.05 [1.04-1.07]	1.02 [1.01-1.03]
Age in Years of Youngest Child in Family	0.97 [0.97-0.98]	0.99 [0.99-0.99]
Each Additional Parental Injury	3.71 [3.62-3.81]	3.51 [3.42-3.60]
Sustaining Injury in Battle	8.02 [7.18-8.96]	1.96 [1.72-2.24]

Whole-Genome Sequencing of 1,688 Veteran Twins to Detect Risk and Measure Rare Variation Associated with Major Depressive Disorder

Authors

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ABSTRACT

Background: Major Depressive Disorder (MDD) is a complex neuropsychiatric disease that can have large impacts on military readiness. However, new insights from genomic associations allow for prediction of an individual's lifetime genetic risk, and provide for the possibility of proactive therapy. Initial studies have identified 47 regions associated with MDD among individuals of European ancestry.

Methods: Here, we report the sequencing of 1,688 whole genomes at 30X mean depth, including 958 monozygotic twins, 626 dizygotic twins, and 73 singletons sequenced in an effort to identify rare genetic variation associated with MDD. Sequencing results were hierarchically clustered using 54 quality metrics to identify and remove bias, resulting in 70 samples being excluded. Veterans were classified as having MDD based on psychiatric interview diagnostic criteria. Using previously published genome-wide association summary statistics from one independent study, we calculated a polygenic risk score (PRS) using 44 loci.

Results: No significant difference was found in PRS among Veterans with a binary history of MDD compared to those without a history as determined by logistic regression. When considering the variable describing the lifetime accrual of symptoms of MDD, there was a trend of increasing PRS among those with symptoms compared to without symptoms by increasing symptom count as determined by negative-binomial regression. Additionally, when considering the severity of illness, there was a significant difference in PRS when comparing Veterans with severe depression to those without severe disease as determined by logistic regression.

Conclusions: A deeper exploration of the 44 loci is underway. These preliminary results may represent a replication of the MDD associations in a new independent cohort and provide support for undertaking a deeper investigation of MDD rare variation. Precise quantification of genetic risk can potentially provide an early warning allowing for the avoidance of exposures that may cause this complex and chronic disease.

Antidepressant Activity of the Selective Kappa Opioid Receptor Antagonist JNJ-67953964 in Mice

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ABSTRACT

Background: Major depressive disorder (MDD) is a leading cause of disability worldwide that is precipitated and/or exacerbated by stress exposure. Dysregulation of the endogenous opioid system is implicated in the emergence of MDD. Stress increases dynorphin-induced activation of kappa opioid receptor (KOR) signaling, which is known to produce negative affect, dysphoria, and aversion. KOR blockade produces behavioral effects in rodent tests used to screen novel antidepressant compounds that are indicative of potential antidepressant-like activity. JNJ-67953964 (previously LY2456302 and CERC-501) is the only selective KOR antagonist currently in clinical trials for MDD, yet there are no preclinical studies systematically evaluating this compound in animals exposed to stress. In these experiments we investigated the ability of JNJ-67953964 to ameliorate the behavioral deficits produced by exposure to a chronic mild stress paradigm.

Method: Adult male C57BL/6J mice were exposed to four weeks of unpredictable chronic mild stress (UCMS). After three weeks of stress, JNJ-67953964 (10 mg/kg) was administered for 12 days. Behavioral assessments included nest building, sucrose preference test, forced swim test (FST), and the hot plate.

Result: Exposure to UCMS reduced nesting, increased immobility on the FST, induced deficits in sucrose preference, and produced thermal hyperalgesia. Exposure to JNJ-67953964 reversed all of these deficits. JNJ-67953964 reversal of stress-induced behavioral deficits persisted for 3 weeks post treatment cessation.

Conclusions: Our data show that the KOR antagonist JNJ-67953964 is capable of counteracting a stress-induced phenotype on several behavioral tests. In addition, this is the first study to evaluate the effects of chronic mild stress on nesting, and we demonstrated that nesting is a useful assay to test the effects of stress. In sum, these results encourage further clinical development of JNJ-67953964 as a therapeutic for stress-related disorders.

Safety and Confidence in Law Enforcement During Terrorist-Related Events: Association with Daily Life Activities

Authors

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ABSTRACT

Objective: This study examined the relationship of perceived safety and confidence in law enforcement to changes in daily life activities during the Washington, D.C. sniper attacks, which occurred over a 3-week period in October, 2002.

Methods: Participants were 1238 Washington, D.C. area residents assessed using an internet survey that included items related to safety (at work, at home, and in general), confidence in law enforcement, and changes in routine activities of daily life. These changes were defined as either increases or decreases in the following activities: 1)being in large public places (e.g., shopping malls); 2)getting gas; 3) sending one's child(ren) to school and activities; 4) attending large public gatherings (e.g., concerts or sporting events); 5)travelling by public transportation; 6)travelling by automobile; and 7)attending faith-based activities. Univariate and multivariate logistic regression analyses investigated the relationship of confidence in law enforcement and perceived safety to any changes in routine life activities.

Results: A majority of participants (52%, n=640) reported changes in daily life activities, with approximately one-third identifying changes related to being in large places (37%, n=461) and getting gas (36%, n=445). Perceived safety was associated with confidence in law enforcement ($r = .32$, $p < .001$). After adjusting for demographics, lower feelings of safety and less confidence in law enforcement, both independently and together in separate models, were related to a higher likelihood of changes in daily activities.

Conclusions: Terrorist events affect feelings of safety and disrupt routine activities. Safety is both an individual perception and community experience. Focus on strengthening community relationships with law enforcement and community resources that provide support, may enhance perceived safety, decrease feelings of threat, and maintain community members' involvement in daily life activities. Additional research is needed to further articulate how perceived safety and confidence in law enforcement interact to influence community behaviors following terrorist and other disaster events.

Effect of Prior Hurricane Experience on Preparedness in Florida Department of Health Workers

Authors

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ABSTRACT

Objective: The extent to which one feels prepared may influence initial responses to disaster exposure, such as fear, anxiety, and helplessness, and affect the time it takes to recover. This study examined preparedness behaviors in Florida Department of Health (FDOH) workers following the 2004 and 2005 hurricane seasons, and the effect of hurricane experience on feelings of preparedness.

Methods: Participants were FDOH workers assessed 9 months following four hurricanes and one tropical storm during a seven-week period in August and September of 2004 (n=4676) and one year later, after the 2005 hurricane season (n=3460). During the first assessment, participants' ages ranged from 18-79 years (M=47.81). Most were female (79.8%), married (65.5%), White (71.6%). Nearly half had less than a BA/BS degree (49.6%). Participants completed a questionnaire that included items examining hurricane preparedness, defined by having the following resources: 1) home emergency preparedness plan; 2) 2+ days of food and water; 3) flashlight; 4) portable radio; 5) spare batteries; 6) emergency phone numbers; and 7) plan to communicate with family/friends. Additional items assessed the extent to which participants felt prepared before and after the 2004 and 2005 hurricanes, indicating whether experience affected preparedness over time.

Results: A majority of participants at Time 1 (72%) and Time 2 (77%) reported having at least six preparedness items, demonstrating a high level of hurricane preparedness. Perceived levels of preparedness increased from before the 2004 hurricane season (23%) to after the hurricanes (41%), decreased slightly in the period before the 2005 hurricane season (34%), increasing again following hurricane exposure (47%), suggesting an effect of experience on feelings of preparedness.

Conclusions: Findings illustrate the high level of preparedness among FDOH workers, who are trained in disaster response. Disaster-related experiences may further influence feelings of preparedness and have emergency public health implications for enhancing preparedness behaviors that optimize disaster response and improve community safety.

The 3 Predator Exposure Model as a Robust Animal Model of Traumatic Stress

Authors

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ABSTRACT

Background: An estimated 12-20% of soldiers exposed to psychological trauma during the course of a deployment in present-day conflicts go on to develop adverse symptoms of post-traumatic stress disorder (PTSD). The Performance Assessment and Chemical Evaluation (PACE) Laboratory identifies and tests novel compounds for efficacy using a preclinical rat model of traumatic stress to develop treatments for combat-related stress.

Methods: The PACE laboratory developed a three predator stress model, combining the live exposure of multiple predators: (snake, cat, and ferret). Exploratory and anxiety-like behaviors are measured in male rats under basal conditions, as well as 24 hours, 48 hours, and 192 hours (7 days) following a single-day sequential exposure to three predator species (snake, ferret and cat) to model a threat to life exposure. Rats spend 5-10 minutes with each of the predators, in a protective enclosure that maximizes sensory exposure to each predator.

Results: Predator-exposed (n = 33) and control sham (n = 35) group data was compiled from multiple studies to analyze model effectiveness and to assess the trajectory of traumatic-stress related behaviors. Preliminary analyses indicate that predator exposure results in increased anxiety-like behavior in the elevated plus maze compared to control animals at 24H using the anxiety index formula by Cohen et al. 2008 ($t = 2.363$, $p = 0.02$) but not at 48H or 192H.

Conclusions: Elevated plus maze data from multiple studies support the hypothesis that the 3 predator exposure increases anxiety 24 hours after exposure. Additionally, rats showing increased anxiety-like behaviors at baseline also demonstrate elevated anxiety-like behaviors across time compared to animals showing low anxiety-like behaviors at baseline. There are individual differences in anxiety-like response to predator exposure that can be used to model the trajectory of human response to traumatic stress. Additional predictive factors are being evaluated.

Does Damage to the Medial Frontal Gyrus in Chronic Mild TBI Patients Affect Post Traumatic Stress Symptoms?

Authors

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ABSTRACT

Background: Differentiating between post traumatic stress disorder (PTSD) and chronic mild Traumatic Brain Injury (mTBI) is challenging due to significant symptom overlap, and the absence of objective indicators. The focus of this work is to examine how post-traumatic stress influences task-free resting state brain connectivity of the default mode network in a sample of military chronic mTBI subjects.

Methods: Control subjects (N=44, age=36±9.7 years, M=28) without a history of TBI were compared with chronic mTBI subjects with low (N= 58, PCL-C total < 30), medium (N= 124, PCL-C total = 31–49), and high (N= 105, PCL-C total ≥60) post-traumatic stress symptoms. Functional MRI data were acquired on a 3T scanner for a six-minute task-free scan. Voxel-wise t-tests were performed on the default mode network to compare the control group, and each of the mTBI groups, using age as a nuisance regressor.

Results: A pattern of disrupted connectivity was observed in the right medial frontal gyrus (Brodmann area 10) across all chronic mTBI subjects. However, connectivity within a network of brain regions comprising the anterior cingulate, temporal lobes and parahippocampal gyrus, varied with intensity of PCL-C scores. Damage to Brodmann area 10 could disrupt executive function and attention processes involved with emotional regulation and memory encoding, rather than a fear related response.

Conclusions: The results suggest a potential contextual dependent construct of fear, in which the brain attempts to regulate memories and emotions relating to prior traumatic experiences. Such consolidation of memories or emotions may occur during the absence of explicit external stressful stimuli, and may differ from a fear related response that involves the amygdala. Future work will test amygdala connectivity in the task free context. Results from this study have the potential for the development of in-vivo indicators for future research pertaining to PTSD and chronic mTBI.

Longitudinal Changes in Children's Mental Health and Physical Injury Rates Following Father Death

Authors

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ABSTRACT

Objective: In a prospective, case-controlled study, we examined longitudinal changes in prevalence rates of mental health conditions, physical injuries, and outpatient healthcare visits among children of deceased active-duty male service members compared to their non-bereaved peers.

Methods: International Classification of Diseases codes drawn from outpatient medical records were used to determine the rates of mental health conditions, physical injuries, and outpatient healthcare visits among bereaved children (n = 1142; M age = 8.8, SD = 5.0) and time-yoked controls (n = 1142; M age = 9.2, SD = 4.7) matched on age, baseline physical and mental health utilization, service member parent deployment history, and service member parent rank. Logistic regressions were used to examine prevalence risk ratios one year prior (Yr-1) and two years following (Yr+1, Yr+2) father death in bereaved compared to non-bereaved children.

Results: Comparisons of pre- and post-loss prevalence rates of mental health conditions among bereaved children indicated that rates of depression, anxiety, stress disorder/PTSD, and adjustment disorder were two- to nine-times higher 1- to 2-years following father death. Prevalence of behavioral disturbances and fractures also increased in the second year post-loss. With the exception of depression, no pre- to post-loss increases in prevalence of mental health conditions and physical injuries were observed among non-bereaved youth. Comparisons of longitudinal changes in prevalence of mental health conditions and physical injuries between bereaved and non-bereaved children indicated that only adjustment disorder increased at a significantly higher rate from Yr-1 to Yr+1 in bereaved compared to non-bereaved youth. In addition, the average number of mental healthcare visits was significantly higher for bereaved compared to non-bereaved youth both years post-loss.

Conclusions: Father death is associated with increased prevalence of psychiatric conditions, physical injuries, and mental health care utilization 1- to 2-years post-loss in children from treatment-seeking military families.

Influence Of Attentional Bias on Scanpaths In Posttraumatic Stress Disorder: Assessment of Vigiliance-Avoidance Scanning Patterns During Visual Search Paradigm

Authors

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ABSTRACT

Objective: Eye-tracking tasks allow investigation of sustained attention to threat, which has been implicated in posttraumatic stress disorder (PTSD). Antisaccade performance in the context of affective cues has revealed inhibitory control deficits in a Veteran PTSD population. This study aims to examine visual scanning patterns in Veterans with PTSD by quantifying the spatial arrangements of visual fixations during eye-tracking tasks with and without cognitive-emotional interference.

Method: Thirty-six veterans were recruited from the Washington DC Veterans Affairs Medical Center, and classified into two groups (17 PTSD diagnosed vs. 19 controls) based on the Clinician Administered PTSD Scale (CAPS). Participants completed prosaccade (PS) and antisaccade (AS) eye movement direction tasks under two conditions; (1) standard condition (STD) that utilized square and circle images, and (2) face condition (FACE) that utilized neutral and negative emotional face images. The nearest neighbor index (NNI) algorithm was employed to measure the spatial pattern of gaze points. Two Gaussian generalized linear models were used to estimate the linear relationships between the NNI and three predictors (Group, Condition, and Direction), and between the NNI and CAPS.

Results: The linear model indicated that: (a) there is a significant linear relationship between the NNI and three predictors; (b) eye tracking patterns in veterans with PTSD were less clustered than controls regardless of Condition or Direction; (c) all participants' clusters were tighter during STD and PS; (d) NNI and CAPS were positively correlated.

Conclusions: This study revealed that the Veterans with PTSD exhibited face avoidance and more scattered scanning in the antisaccade eye-tracking tasks, and such avoidance symptom of PTSD can be successfully assessed through visual scanning pattern analysis. Thus, our results demonstrated that this task and analytical approach can be used as a novel cost-effective tool for assessing PTSD in a veteran population with the future possibility of informing diagnosis.

Mild Traumatic Brain Injury with Concurrent PTSD is Associated with Peripheral Tau Concentrations

Authors

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ABSTRACT

Objective: Mild traumatic brain injuries (mTBIs) with comorbid post-traumatic stress disorder (PTSD) is common in military personnel following recent deployments. Given that TBI and PTSD are associated with an increased risk of Alzheimer's disease and related dementias, we aimed to examine if mTBI and comorbid PTSD had cumulative effects on peripheral tau concentrations in two cohorts of military veterans and service members.

Method: Cohort 1 included military personnel who were treated at Walter Reed National Military Medical Center following mTBI. Participants were divided into three groups: mTBI-Neg/PTSD-Neg (n=18), mTBI-Pos/PTSD-Neg (n=64), and mTBI-Pos/PTSD-Pos (n=21); Age M=34.1years (SD=10.1). Cohort 2 included personnel who were referred to the Madigan Sleep Disorders Clinic. Participants were split into four groups: mTBI-Neg/PTSD-Neg (n=59), mTBI-Neg/PTSD-Pos (n=11), mTBI-Pos/PTSD-Neg (n=17), and mTBI-Pos/PTSD-Pos (n=25); Age M=33.3 years (SD=7.9). The cohorts were analyzed separately using ANOVA models, with Bonferroni adjustment.

Results: For Cohort 1, ANOVA showed significant group differences on tau ($p<.01$). Post-hoc analyses revealed that the mTBI-Pos/PTSD-Pos group had significantly higher tau than the mTBI-Neg/PTSD-Neg group ($p=.02$) and trended towards higher than the mTBI-Pos/PTSD-Neg group ($p=.06$). The mTBI-Pos/PTSD-Pos and mTBI-Neg/PTSD-Pos groups did not significantly differ ($p>.05$). These results were validated with Cohort 2; ANOVA showed group differences on tau ($p<.05$). Post-hoc analyses revealed that the mTBI-Pos/PTSD-Pos group had significantly higher tau than both the mTBI-Neg/PTSD-Neg and mTBI-Pos/PTSD-Neg groups ($p<.05$).

Conclusion: These results are the first to identify that a history of mTBI and comorbid PTSD is associated with increased peripheral tau. This provides insight into potential pathways for intervention and monitoring to ameliorate negative outcomes following mTBI in military personnel.

The Relationship of PTSD to Anxiety and Depression: An Examination of the Moderating Effect of Sleep Quality and Nightmares

Authors

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ABSTRACT

Background and Objectives: PTSD is a significant health concern for the United States military population. It causes significant distress in a service member's life and is often accompanied by other mental health symptoms. As many as 70% of service members with PTSD experience significant sleep disturbance and upwards of 90% report trauma-related nightmares. These sleep problems are known to exacerbate PTSD symptom development as well as negatively impact patient functioning. Patients with PTSD also often report symptoms of anxiety and depression. The numerous co-occurring conditions and varied presentations make PTSD challenging to treat. Interventions may be improved by better understanding the relationship of these comorbid conditions. Because sleep disturbances are hallmark features of PTSD, anxiety, and depression, we examined the role of sleep disturbances in the relations among these disorders.

Methods: Participants were 51 treatment-resistant (i.e., not fully responsive to SSRI and/or SNRI treatment) active duty service members and veterans of OIF, OEF, and OND. Participants were recruited for participation in a randomized control trial examining the effectiveness of Riluzole as an augmentation medication for PTSD. Riluzole is a glutamate modulator that may improve outcomes compared to treatment with SSRIs or SNRIs alone.

Results: Notably, sleep disturbance was found to be a moderating factor in the relationship of PTSD to anxiety and depression. Also, nightmares moderated the relationship of PTSD to depression. Additional analyses indicate that the relationship between PTSD and anxiety and depression is strengthened as symptoms of sleep disturbance and nightmares increase.

Conclusions: These results demonstrate the potentially important role sleep plays in understanding the comorbidity of PTSD and anxiety or depression. By targeting sleep disturbances in treatment for PTSD, patients may see greater reductions in symptoms of comorbid anxiety and depression than treatment for PTSD alone, perhaps leading to increased functioning and quality of life.

The opinions and assertions expressed herein are those of the author(s) and do not necessarily reflect the official policy or position of the Uniformed Services University or the Department of Defense. Additionally, the authors have no conflicts of interests to report.

A Population Study of Incidence Rates of Posttraumatic Stress Disorder in the US Military (2007-2015): Analysis of Age, Sex, and Marital Status

Authors

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ABSTRACT

Background: The rate of Posttraumatic Stress Disorder (PTSD) in the military is a frequently-studied and often-contested area in trauma research. Prevalence rates vary widely from 1.4% to 41.3%. Further, systematic reviews suggest a rate between 8% and 15%. Additionally, the literature differs in terms of rates across demographic factors. The wide range of rates reported across the literature may be due to factors such as the size and composition of the sample as well as the method of assessment.

Methods: By accessing the Military Health System Data Repository (MDR), this study aimed to determine the overall rate and demographic trends of initial diagnosis of PTSD in the US Military population between 2007 and 2015. PTSD diagnosis was determined by ICD-9 code in direct care inpatient and outpatient records for Active Duty and Reserve Component military. Rates were calculated based on counts from the Defense Enrollment Eligibility Reporting System (DEERS).

Results: During the study period, the rate of PTSD diagnosis peaked in 2012 (9.69 per 1000-person years) before declining through 2015. Notably, rates of PTSD diagnosis in females steadily increased after 2012, while male rates decreased. Rates were consistently highest among those over age 40 and lowest in those under 20. Single Service members had the lowest PTSD diagnosis rates, followed by married, and then divorced personnel.

Conclusions: These findings provide the most comprehensive view of rates of PTSD diagnoses in the military to date. Additionally, they highlight important differences across basic demographic characteristics within the US military. Therefore, these findings may help to identify service members at greater risk of developing PTSD as well as to inform targeted interventions.

The opinions and assertions expressed herein are those of the author(s) and do not necessarily reflect the official policy or position of the Uniformed Services University or the Department of Defense. Additionally, the authors have no conflicts of interests to report.

Sex-related Differences of Intravenous Ketamine Infusion on Stress Hormone and Fear Memory in Rats

Authors

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ABSTRACT

Background: The U.S. Department of Defense has recently opened combat roles to women that were previously restricted to men. As a result of this policy change, military doctors and nurses can anticipate an increased frequency of combat-related injuries in female service members in future military conflicts. Ketamine, an NMDA receptor antagonist, is a preferred battlefield analgesic due to its hemodynamic stability and a lack of respiratory suppression in wounded service members. However, ketamine administration in the peri-trauma period can produce dissociation and hallucination which may strengthen the traumatic memory formation. We previously reported that subanesthetic intravenous (IV) ketamine infusion (0–10 mg/kg) dose-dependently increased stress hormone corticosterone (CORT) levels and fear memory in male rats.

Method: We investigated the effects of IV ketamine infusion on those measures in intact female rats. Adult female Sprague-Dawley rats received a 2-hour IV ketamine infusion (0 or 10 mg/kg) immediately after the fear conditioning (3 times of auditory tone and mild footshock pairing). Spontaneous locomotor activity was monitored during the infusion and plasma CORT levels were measured using the ELISA method. Fear memory retrieval, fear extinction, and fear recall were tested between 2 and 4 days after the fear conditioning/ketamine infusion.

Results: The IV ketamine infusion reduced locomotor activity and elevated plasma CORT levels in female rats. The elevated CORT levels following ketamine infusion were greater in female rats than in male rats. The ketamine infusion following fear conditioning enhanced fear memory and this effect appeared to be greater in female rats than in male rats.

Conclusions: The study is in progress to confirm the current findings and to further investigate potential contribution of sex hormones (estrogen and progesterone) to the effects of IV ketamine infusion on fear-related disorders.

Funding: TriService Nursing Research Program and Center for the Study of Traumatic Stress

Gene Expression Differences in PTSD Are Uniquely Related to the Intrusion Symptom Cluster: A Transcriptome-Wide Analysis in Military Service Members

Authors

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ABSTRACT

Background: Posttraumatic stress disorder (PTSD) is associated with wide-spread immune dysregulation; however, little is known about the gene expression differences attributed to each PTSD symptom cluster: intrusions (flashbacks), avoidance, negative alterations in cognition and mood, and arousal symptoms. This is an important consideration when identifying diagnostic and treatment response markers in highly comorbid populations with overlapping symptoms.

Methods: We utilized a transcriptome-wide analysis of differential gene expression in peripheral blood by comparing military service members: (1) with vs. without PTSD, (2) with high vs. low PTSD cluster symptom severity, and (3) with improved vs. not improved PTSD symptoms following 4 to 8 weeks of sleep-focused treatment. Data were analyzed at a ±2.0-fold change magnitude, FDR≤0.05 with subsequent pathway analysis.

Results: In participants with PTSD (*n*=39), 89 differentially expressed genes were identified. In participants with high intrusion symptoms (*n*=22), 1040 differentially expressed genes were identified. No differentially expressed genes were identified for the remaining PTSD symptom clusters, which overlap with other conditions. Ten discrete genes (*C5orf24, RBAK, CREBZF, CD69, PMAIP1, AGL, ZNF644, ANKRD13C, ESCO1,* and *ZCCHC10*) were upregulated in participants with high intrusion symptoms at baseline and downregulated in participants with improved symptoms following treatment. Pathway analysis identified upregulated immune response systems and metabolic networks with a NF-kB hub linked to high intrusion symptoms, which were downregulated with symptom reduction.

Conclusion: Between group (PTSD vs. control) gene expression differences were almost entirely attributed to the intrusion symptom cluster (98%). We previously reported that brain volume alterations were unrelated to overall PTSD severity, but inversely related to intrusion symptom scores. Taken together, our findings provide a novel reference dataset, which can inform the development of precise PTSD diagnostic biomarkers and therapeutic targets.

Nightmare Deconstruction and Reprocessing: Proof of Concept of a Novel Treatment for PTSD-Related Nightmares and Insomnia

Authors

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ABSTRACT

Background/Objectives: Nightmares and insomnia are signature symptoms of posttraumatic stress disorder (PTSD) and are commonly refractory following evidence-based treatment (EBT). EBTs such as Prolonged Exposure and Cognitive Processing Therapy utilize fear memory extinction and reconsolidation but do not target sleep symptoms. Given that nightmares may play a role in trauma memory maintenance, developing a psychotherapy that activates trauma memory through exposure to nightmare images may facilitate trauma memory reconsolidation. This proof-of-concept study is investigating Nightmare Deconstruction and Reprocessing (NDR), a three-stage treatment that integrates exposure to nightmare images, meaning-making and reprocessing, and nightmare reconstruction and rehearsal. Our aims are to test NDR's plausibility as a treatment for PTSD-related nightmares and to test the feasibility of methods intended for use in a future large-scale randomized controlled trial.
Methods: Treatment plausibility will be tested by analyzing pre-to-post-treatment changes in nightmare and insomnia. Methods being tested include collection of blood samples within a prescribed circadian window (0800-1200) and participant compliance with daily download of physiologic data from a wristband device and completion of psychometric measures. Participants are up to 30 combat veterans with trauma-related nightmares and insomnia who are being recruited at Walter Reed National Military Medical Center. Primary outcomes are nightmare severity (Disturbing Dreams and Nightmare Severity Index) and insomnia severity (Pittsburgh Sleep Quality Index). The Empatica E4 wristband enables collection of actigraphic data to measure sleep disturbance and heart rate variability and electrodermal activity to monitor in-session stress during nightmare exposure. Finally, brain-derived neurotrophic factor and inflammatory markers (IL-2, IL-6, and CRP) will be assayed from blood samples taken at baseline, first exposure to nightmare images, and post-treatment.

Results: Results for the current study are pending.

Discussion: Results on NDR's plausibility as a treatment and feasibility of study methods will provide evidence for testing NDR in a large-scale randomized clinical trial.

Region- and Time-Dependent Gene Regulation in the Amygdala and Anterior Cingulate Cortex of a PTSD-Like Mouse Model

Authors

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ABSTRACT

Background/Objectives: PTSD is developed by exposure to a threatening and/or a horrifying event and characterized by the presence of re-experiencing, hyperarousal, and avoidance for a prolonged period of time. However, the stage-dependent alteration of gene regulation in emotional regulatory regions is not well-elucidated.

Method: PTSD-like mouse model was constructed by electric foot shock (1.5 mA for 2 sec ×8 times) followed by situational reminders. Fear memory sustainability was assessed by measuring avoidance latency and freezing behavior in the same context up to 5 weeks post stress (PS). Anxiety-like behavior was assessed by open field test, elevated plus maze test, and light/dark box test at 2 and 4 weeks PS. Acoustic startle response test was performed at 2 and 4 weeks PS. The amygdala (AMY) and anterior cingulate cortex (ACC) were dissected from the mice at 2 and 5 weeks PS and employed RNA-sequencing analysis.

Results: Contextual fear memory was sustained up to 5 weeks PS. Anxiety-like behavior was shown after 2 weeks and continued at 4 weeks PS, while exaggerated startle response emerged after 4 weeks PS. RNA sequencing revealed more than 1,000 differentially expressed genes were identified at 2 weeks PS in both regions. The number of the regulated genes remained constant in AMY at 5 weeks PS, whereas those in ACC were plummeted. Although synaptic remodeling and endocrine system were the most enriched signaling pathways in both ACC and AMY, the individual gene expression profile was regulated differentially in a region- and time-dependent manner. In addition, several genes associated with PTSD involved in Hypothalamic-Pituitary-Adrenal axis were regulated.

Conclusion: In our PTSD-like mouse model, global gene expression profile showed synaptic remodeling and endocrine systems are most critical for disease development. The dynamic gene regulation could provide a clue to the molecular mechanism for disease development.

The Effects of Comorbid TBI and PTSD Symptoms among U.S. Active Duty Service Members on an Objective Cognitive Performance Measure

Authors

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ABSTRACT

Background and Objectives: More than 2.8 million US military personnel have deployed to Iraq and Afghanistan since September 11, 2001. Both traumatic brain injury (TBI) and posttraumatic stress disorder (PTSD) have been labeled "signature wounds" of these conflicts, and often co-occur as brain injuries are frequently sustained during traumatic events. Nearly 380,000 service members were diagnosed with a TBI between 2000 and 2017, and upwards of 440,000 service members returned home from these conflicts with PTSD. Both of these debilitating conditions can result in considerable cognitive concerns for a significant number of service members. Despite their frequent comorbidity and overlapping symptoms, there is a dearth of knowledge regarding the combined effects of TBI and PTSD on cognitive performance.

Methods: The present study examined the potentially synergistic effects of comorbid TBI and PTSD symptoms (PTS) on cognitive functioning using data from 211 active duty service members previously collected as part of a larger clinical database at the National Intrepid Center of Excellence's Brain Fitness Center (BFC) at Walter Reed National Military Medical Center. In accordance with the BFC's normal standard of care procedures, service members completed a variety of self-reports, including the PTSD Checklist (PCL-C), as well as an objective cognitive assessment, the Automated Neuropsychological Assessment Metrics version 4 Traumatic Brain Injury (ANAM-4 TBI).

Results: Notably, service members with TBI did not significantly differ from those with PTS-only on cognitive performance; however, individuals with both TBI and PTS performed worse than those with either condition alone.

Conclusions: Our findings suggest there may be something unique about the combination of TBI and PTSD and their subsequent influence on cognitive performance. Results illustrate the complexity of the relationship between PTSD and TBI and highlight the need for further research in this area.

The views expressed in this abstract are those of the author(s) and do not reflect the official policy of the Uniformed Services University, Department of Army, Navy, Air Force, Department of Defense, or U.S. Government. The identification of specific products, scientific instrumentation, or organizations is considered an integral part of the scientific endeavor and does not constitute endorsement or implied endorsement on the part of the author, DoD, or any component agency. Additionally, the authors have no conflicts of interest to report.

Fear Memory Extinction is Blocked In Rats Following Acute Glial Cell Inhibition: Implications for Targeting Neuroinflammation in Traumatic Stress Exposure

Authors

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ABSTRACT

Background: Emerging evidence suggests a role for both central and peripheral inflammation in post-traumatic stress disorder (PTSD). Moreover, inflammation has been reported to disrupt fear memory extinction as observed in preclinical fear conditioning paradigms. Ibudilast, a PDE4 inhibitor and putative glial cell inhibitor, has been shown to reduce neuroinflammation as well as inflammation-induced behavioral impairments. Here, we characterized Ibudilast for its efficacy in facilitating fear extinction in rats to better understand the role of inflammation in fear learning.

Methods: Adult male rats underwent a single fear conditioning session in which delivery of light and tone cues were associated with the delivery of a mild footshock. The following week, Ibudilast (3 or 10 mg/kg, i.p.) or its vehicle was administered once-daily 1-h prior to a 10-min extinction test for a total of four days, in which freezing behavior was measured. Additionally, behavioral performance in acoustic startle response and elevated plus maze tests was measured under drug-free conditions at various timepoints before and after fear conditioning occurred. Terminal blood and various brain regions were collected for later evaluation of inflammatory cytokine levels.

Results: Ibudilast administration to shock-exposed rats resulted in a sustained level of freezing behavior, suggesting fear extinction was delayed or blocked. Freezing behavior was also observed in the sham-exposed, Ibudilast-treated control group, however the levels did not reach those of the shock-exposed groups and only appeared on the 2nd-4th test day. Moreover, freezing behavior decreased over test days for the sham-exposed, Ibudilast-treated group, but did not reach sham-exposed, vehicle-treated levels.

Conclusions: Although experiments are ongoing, the present results suggests that while a mild Ibudilast-specific effect on motor ability may be involved, Ibudilast modulates aspects of fear learning relative to extinction. These results may have clinically-relevant implications for current pharmacological targets of traumatic stress exposure.

Sex Differences in Cued Fear Responses and Parvalbumin Cell Density in the Hippocampus Following Repetitive Concussive Brain Injuries in C57BL/6J Mice

Authors

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ABSTRACT

Background/Objectives: Repetitive concussive brain injuries (rCBI) may be a risk factor for depression and anxiety disorders, including post-traumatic stress disorder. Animal models of brain injury afford the opportunity for controlled study of the effects of injury on functional outcomes. Despite the participation of female athletes in contact sports, few pre-clinical studies include both sexes in TBI research.

Methods: Male and cycling female C57BL/6J mice sustained rCBI (3x) at 24-hr intervals and were tested in a context and cued fear conditioning paradigm to assess amygdala and hippocampal function. Mice were also tested in the elevated zero maze and tail suspension test for anxiety- and depressive-like symptoms, respectively.

Results: All mice with rCBI showed less freezing behavior than sham control mice during the fear conditioning context test. Injured male, but not female, mice also froze less in response to the auditory cue (tone). Injured mice spent more time in the open quadrants of the elevated zero maze, suggesting decreased anxiety, but there were no differences between injured mice and sham-controls in depressive-like activity on the tail suspension test. Pathologically, injured mice showed increased astrogliosis in the injured cortex and white matter tracts (optic tracts and corpus callosum). There were no changes in the number of parvalbumin-positive interneurons in the cortex or amygdala, but injured male mice had fewer parvalbumin-positive neurons in the hippocampus.

Conclusions: Parvalbumin-reactive interneurons of the hippocampus have been previously demonstrated to be involved in hippocampal-cortical interactions required for memory consolidation, and it is possible memory changes in the fear-conditioning paradigm following rCBI are the result of more subtle imbalances in excitation and inhibition both within the amygdala and hippocampus, and between more widespread brain regions that are injured following a diffuse brain injury.

Influence of Number of Awakenings during the Previous 1-3 Nights on Post Traumatic Stress Symptoms Among Individuals with PTSD

Authors

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ABSTRACT

Background: Little is known how sleep affects Post Traumatic Stress Symptoms (PTSS) from day to day. This study examined the relationship between the number of awakenings from sleep during the previous 1-3 nights and daily level of PTSS among individuals with Post Traumatic Stress Disorder (PTSD).

Methods: Subjects (N = 80) were assessed for probable PTSD at enrollment and individuals with probable PTSD (n = 42) were included in the analyses. Using an ecological momentary assessment methodology, PTSS were assessed four times daily and number of awakenings was assessed once daily by self-report for 15 days. An overall awakenings variable (i.e., person mean) and a previous night awakenings variable (i.e., the difference between the previous night and the individual's mean) were created for number of awakenings from the sleep during the previous night. Similar variables were created for number of awakening from the sleep during the previous two or three nights. Linear mixed models were applied, with controlling for demographic characteristics.

Results: Number of awakenings during the previous night was not associated with PTSS (b = 0.86, p = .064). However, number of awakenings during the previous two (b = 1.76, p = .035) or three nights (b = 1.56, p = .029) was positively associated with PTSS. The overall variables of number of awakenings were not associated with PTSS in all three models.

Conclusions: These preliminary findings suggest that number of awakenings did not have an immediate influence on the following day's PTSS. However, two or three days of disruptive sleep awakenings may have an accumulative effect with more awakenings associated with higher PTSS. Assessing and monitoring changes in sleep and implementing interventions to improve sleep quality may reduce PTSS for individuals with PTSD.

Keywords: post traumatic stress disorder, sleep, symptom assessment, ecological momentary assessment

Disclaimer: The opinions and assertions expressed herein are those of the author(s) and do not necessarily reflect the official policy or position of the Uniformed Services University, Department of Army/Navy/Air Force, Department of Defense, or U.S. Government.

Sex-Related Differences of Mitochondrial DNA Copy Number in Active Military Service Members with PTSD

Authors

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ABSTRACT

Background: The lifetime prevalence of PTSD has been observed to be about 10–12% in women and 5–6% in men suggesting a sex-related difference in PTSD prevalence. PTSD is associated with mitochondrial DNA copy number (mtDNAcn), which is an emerging systemic index of mitochondrial biogenesis and function. Together, these results lead to a hypothesis that there is a sex-related difference between mtDNAcn levels, which may allow mtDNAcn levels to be used as a potential biomarker to identify PTSD or monitor PTSD symptoms.

Methods: mtDNAcn was assessed with a TaqMan assay using white blood cells from service members with (n=137; male: 123, female: 14) or without (n=673; male: 606, female: 67) PTSD, who served during combat operations in the Afghanistan and/or Iraq wars between 2008 and 2016. The limitation of this study is a relatively small female sample size, and so a comprehensive with a larger female sample size study might be needed in the future. The Institutional Review Board at the Uniformed Service University of Human Sciences approved all study procedures and all participants were given written informed consent. PTSD symptoms were assessed using the PTSD Checklist (PCL), a 17-item, DSM-based, self-report questionnaire with well-established validity and reliability. PTSD diagnosis was determined based on endorsement of DSM-IV criteria and a PCL total score ≥ 44. The severity of PTSD symptoms was determined using the PCL total score. Subjects with depression, substance abuse, or any medication use were excluded. Demographic data, such as age, gender, and race, were collected.

Results: mtDNAcn was significantly higher in female service members with PTSD compared with either male/female non-PTSD controls or male service members with PTSD ($p<0.05$). However, there was no significant difference of mtDNAcn between male service members with PTSD and male/female non-PTSD controls.

Discussion: This study provides the first evidence showing significantly increased mtDNAcn levels in female service members with PTSD, but not in male service members with PTSD. This suggests that altered mtDNAcn in PTSD may be sex-dependent, at least relating to active service members, and reflect impaired energy metabolism, which might represent a novel aspect of PTSD pathophysiology and serve as a biomarker for PTSD in females.

Continuing Education Credit

The Amygdala, Stress, and PTSD Conference, in conjunction with the Center for Deployment Psychology at the Uniformed Services University is pleased to offer continuing education credits for Physicians, Psychologists, Social Workers, and Nurses. The credits are available through live in person attendance.

Continuing Education made possible in part by the generous support of the Center for Deployment Psychology.

American Psychiatric Association (APA)

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This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education through the joint providership of the American Psychiatric Association (APA) and Society of Uniformed Services Psychiatrists. The APA is accredited by the ACCME to provide continuing medical education for physicians.

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Disclosure Information

Derrick A. Hamaoka, MD – Nothing to disclose
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Katy Pokorny – Nothing to disclose
Dennis S. Charney, MD – *(See next page)*
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Role: Key Personnel, Co-Mentor 23629 (PI: Balchandani) 01/15/16-01/14/19 Brain and Behavior Research Foundation Development of 7T MRI protocol to establish imaging biomarkers for depression Role: Key Personnel, Mentor Completed Research Support (Past 3 Years K23MH099223 (PI: Iacoviello) 08/19/13 – 07/31/18 (Transferred) NIMH A Novel Cognitive Training Intervention for Depression Role: Key Personnel, Mentor 2013098 (PI: Murrough) 07/01/13-06/30/17 (Ended Early) Doris Duke Charitable Foundation Ketamine Plus Lithium as a Novel Pharmacotherapeutic Strategy fin Treatment-Resistant Depression

Role: Key Personnel, Mentor K23MH094707 (PI: Murrough) 07/15/11-05/31/16 NIH Functional MRI Studies of Emotion IN Depression and Rapid Antidepressant Response

Named co-inventor US Patent No. 9,592,207 - Intranasal Administration of Ketamine to Treat Depression (Issued March 14, 2017); US Patent No. 9,539,220 - Methods for Treating Suicidal Ideation (Issued January 10, 2017) ; US Patent No. 8,785,500 - Intranasal Administration of Ketamine to Treat Depression (Issued July 22, 2014) ; US Patent No. 10,123,737 - Systems and Methods for Treating a Psychiatric Disorder (Issued November 13, 2018) ; US CON Patent Appl No. 16/189,059 – and related foreign patent applications - Systems and Methods for Treating a Psychiatric Disorder US Provisional Patent Appl No. 62/649,469 – Brain Plasticity Following Cognitive-Emotional Training ; US CON Patent Appl No. 14/974,576 and related foreign patent applications - Method for Treating Post Traumatic Stress Disorder (PTSD) ; US Serial No. 14/889,746 and a related foreign patent application - Treatment of Mood and Anxiety Disorders ; US CON Patent Appl Nos. 15/379,013 and 15/417,689 - Intranasal Administration of Ketamine to Treat Depression.

Meeting Objectives

At the end of this educational activity, the learner will be able to:

- Understand how gpsychological stress alters brain function.
- Understand psychobiological mechanisms of human resilience to stress.
- You can train to be more resilient.
- Implications for your own life.
- Describe the importance of sleep as a biological force multiplier in psychological health, resilience, and readiness.
- Explain the interaction between sleep and neural circuits underlying threat- and goal-oriented behaviors.
- Detail the nature and impact of sleep-focused interventions on psychological health.
- Describe the proteins that relate to PTSD as well as traumatic brain injury (TBI) symptoms.
- Describe gene-activity profiles that relate to chronic PTSD symptoms.
- Determine the long-term biological changes that relate to TBI and PTSD, which may have morbidity risks associated with them.
- Conceptualize hope as a practice, i.e. “something you do” rather than “something you feel.”
- Demonstrate rapid assessment of patients’ competencies for mobilizing hope in stressful circumstances.
- Formulate and design interventions to mobilize hope when a patient is demoralized.
- Show how empirical social psychology and social neuroscience can expand the scope and potency of psychotherapeutic interventions to mobilize hope and counter demoralization.
- The state of research on developing rapid acting antidepressants for treatment-resistant depression.
- The potential benefits of using ketamine in the treatment of mental health disorders.
- The potential negatives of using ketamine in the treatment of mental health disorders.

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Free Continuing Education (CE) Credits are available for this workshop. This event is sponsored through the Department of Behavioral Health, Brooke Army Medical Center. Department of Behavioral Health, Brooke Army Medical Center is approved by the American Psychological Association to sponsor continuing education for psychologists. Department of Behavioral Health, Brooke Army Medical Center maintains responsibility for this program and its content. 3.75 credit hours will be given for full attendance at the workshop. No partial credit will be provided. A sign-in /sign-out sheet as well as an evaluation form must be completed in order to receive CE credits and a certificate.

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Date: April 16, 2019

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NURSES/NURSE PRACTITIONERS/CLINICAL NURSE SPECIALISTS: This activity consists of 3.75 clock hours of continuing education instruction. Credit requirements and approvals vary per state board regulations. Please save the course outline, the certificate of completion you receive from this activity and contact your state board or organization to determine specific filing requirements.

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an individual course may be accepted for continuing education credit. PESI, Inc. maintains responsibility for the course. ACE provider approval period: January 27, 2017 - January 27, 2020. Social Workers completing this course receive 3.75 Clinical Practice continuing education credits for completing this course. Course Level: Intermediate. A certificate of attendance will be awarded at the end of the program to social workers who complete the program evaluation. Full attendance is required; no partial credits will be offered for partial attendance.

PENNSYLVANIA SOCIAL WORKERS, MARRIAGE & FAMILY THERAPISTS AND PROFESSIONAL COUNSELORS: This intermediate activity consists of 3.75 clock hours of continuing education instruction. Credit requirements and approvals vary per state board regulations. Please contact your licensing board to determine if they accept programs or providers approved by other national or state licensing boards. A certificate of attendance will be awarded at the end of the program to participants who are in full attendance and who complete the program evaluation. Full attendance is required; no partial credits will be offered for partial attendance.

OTHER PROFESSIONS: This activity qualifies for 225 minutes of instructional content as required by many national, state and local licensing boards and professional organizations. Save your course outline and certificate of completion, and contact your own board or organization for specific requirements.

Credits listed are for full attendance only. Certificates of Completion are emailed 3-4 weeks after the event and after attendance has been verified to those who attend the full seminar. Please see "live seminar schedule" for full attendance start and end times. NOTE: Boards do not allow credit for breaks or lunch. If your profession is not listed, please contact your licensing board to determine your continuing education requirements and check for reciprocal approval. Materials that are included in this course may include interventions and modalities that are beyond the authorized practice of mental health professionals. As a licensed professional, you are responsible for reviewing the scope of practice, including activities that are defined in law as beyond the boundaries of practice in accordance with and in compliance with your professions standards. PESI, Inc. offers continuing education programs and products under the brand names PESI, PESI Healthcare, PESI Rehab and Psychotherapy Networker.

**CE hours for this activity are being provided by PESI, Inc. Have an inquiry on continuing education credit that is not listed here? Please contact Bridget Schaub at PESI, Inc. before the event. You may reach her via email at bschaub@pesi.com.

Amygdala Conference Training Titles and Learning Objectives

1. **Dennis S. Charney, MD — "Resilience: The Science of Mastering Life's Greatest Challenges"**
    a. Learning Objectives
        i. Articulate how psychological stress alters brain function
        ii. Appraise the psychobiological mechanisms of human resilience to stress
        iii. Point out training methods that increase resilience
        iv. Communicate the implications of improved resilience in their own lives
2. **Anne Germain, PhD — "Wake up to Sleep! A Translational Perspective of the Role of Sleep in Readiness and Resilience"**
    a. Learning Objectives
        i. Deduce the importance of sleep as a biological force multiplier in psychological health, resilience, and readiness
        ii. Assess the interaction between sleep and neural circuits underlying threat- and goal-oriented behaviors
        iii. Communicate the nature and impact of sleep-focused interventions on psychological health
3. **Jessica M. Gill, PhD, RN — "Gene-activity and Proteins that Relate to Chronic PTSD Symptoms"**
    a. Learning Objectives
        i. Point out the proteins that relate to PTSD as well as traumatic brain injury (TBI) symptoms
        ii. Diagnose gene-activity profiles that relate to chronic PTSD symptoms
        iii. Determine the long-term biological changes that relate to TBI and PTSD, which may have morbidity risks associated with them
4. **James L. Griffith, MD— "Mobilizing Hope in the Face of Despair: Applying Social Neuroscience Research in Brief Clinical Encounters"**
    a. Learning Objectives
        i. Appraise how hope is a practice, i.e. "something you do" rather than "something you feel"

ii. Consider methods on assessing patients' competencies for mobilizing hope in stressful circumstances

iii. Provide an overview of interventions to mobilize hope when a patient is demoralized

iv. Analyze how empirical social psychology and social neuroscience can expand the scope and potency of psychotherapeutic interventions to mobilize hope and counter demoralization.

5. Irwin Lucki, PhD — "Preclinical Development of Ketamine and the Metabolite 2R,6R-Hydroxynorketamine For Depression and Other Disorders"

a. Learning Objectives

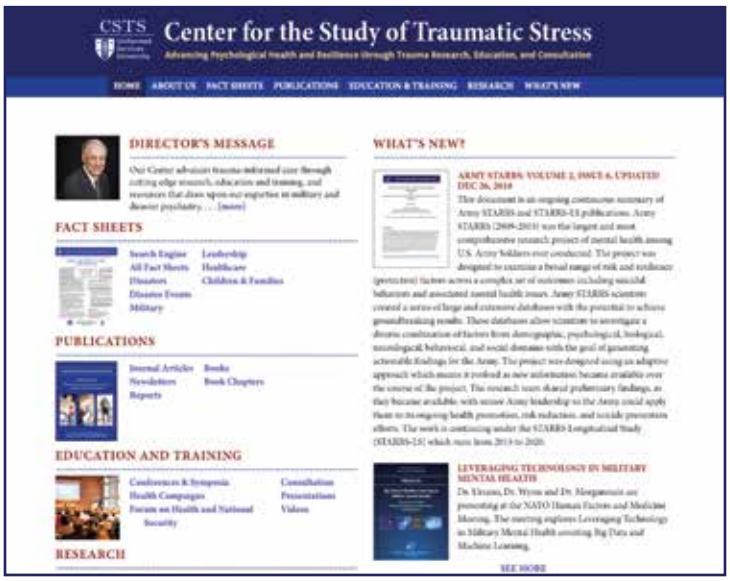
i. Characterize the state of research on developing rapid-acting antidepressants for treatment-resistant depression.

ii. Critique the potential benefits of using ketamine in the treatment of mental health disorders.

iii. Assess the potential negatives of using ketamine in the treatment of mental health disorders.

Notes

Notes



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