Psychiatric and neurologic aspects of war: an overview and perspective

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The growing number of soldiers returning home with psychiatric and neurologic disorders, notably posttraumatic stress disorder (PTSD) and traumatic brain injury (TBI), underscores the need for an interdisciplinary framework for understanding the emergent consequences of combat. Among the challenges facing the scientific community is the development of effective treatment strategies for TBI from blast and other injuries, given the confounding effects of comorbid psychological symptoms on accurate diagnoses. At the individual level, emerging technologies—including virtual reality, the use of genetic biomarkers to inform treatment response, and new brain imaging methodology—are playing an important role in the development of differential therapeutics to best address a soldier’s particular clinical needs. At the macro level, new approaches toward understanding the political, cultural, and ideological contexts of mass conflict, the decision to join in violence, and ways of preventing genocide are discussed.

Keywords: posttraumatic stress disorder; traumatic brain injury; veterans; technology; methodology; virtual reality; valor; terrorist behavior; genocide prevention; mass violence

Introduction to the scope of the conference and proceedings

Though war is a universal and timeless event, documented in the historical record from the earliest days of humanity, each conflict is unique, defined by the specific sociopolitical context of the time. A range of questions from the scientific to the logistical beset those who grapple with the problems of warfare, requiring a multiplicity of perspectives. The Association for Research in Nervous and Mental Disease (ARNMD) conference, “Psychiatric and Neurologic Aspects of War,” brought together distinguished scientists, clinicians, and scholars to discuss some of the issues and potential solutions that have emerged from the U.S. engagement in Iraq and Afghanistan.

One generation’s solutions often create the next generation’s problems. The structure of any given conflict, from the combatants to how the war is waged to the nature of its consequences, is partially defined by the knowledge base of that time. Just as the science and art of warfare have undergone vast changes since as recently as World War II, so have the costs of war for the individual soldier and his or her family. Advances in the sciences and art of war, such as the body armor used by American soldiers, and the medical advances allowing for the treatment of shock from injuries while on the battlefield, has meant the survival of many more soldiers who suffered traumatic blast injuries today than would have been possible even as recently as the Desert Storm conflict, and most certainly since Vietnam. Thus, unlike prior conflicts, the two most common medical problems emerging from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) requiring medical intervention are neuropsychiatric in nature: posttraumatic stress disorder (PTSD) and traumatic brain injury (TBI).

The Association for Nervous and Mental Disorders is a venerable organization with a long-standing interest in bringing together persons in psychiatry and psychology with those in neurology and related disciplines, including neuroscience. Through the years, the organization has taken a broad look
at multiple fields and presented conferences that aim to connect current problems to potential future developments. In this case, the topic of psychiatric and neurologic aspects of war gave rise to a remarkable range of issues. For this meeting, the ARNMD has partnered with The Rockefeller University and the New York Academy of Sciences. To adequately capture the complexity of the issues, the conference was organized to have a keynote session as well as multiple roundtable discussions. The roundtable discussions were thoughtfully and creatively moderated by Timothy Pedley, chair of neurology at Columbia and Charles Marmar, chair of psychiatry at New York University. Our contributors come from a range of backgrounds including psychiatrists, psychologists, neurologists, neurosurgeons, and neuroscientists, as well as scholars from public health, international relations, and political science—many from the armed forces.

Because the detailed aspects of pharmacological and psychological treatment of various neuropsychiatric disorders have been addressed in other information sources in psychiatry, psychology, and neurology, we have chosen to highlight aspects and areas that are extraordinarily important but considered less frequently, including broad issues of war and conflict, before turning to the use of research from clinical neuroscience areas to elucidate issues of specific disorders and the interaction of psychiatric and neurologic problems. Included are new approaches to diagnosis and treatment and the roles of emerging technologies from biological to psychosocial—all of which have promise to aid veterans and their families and that thereby also have implications for the entire population. We have tried to provide a broader framework than has traditionally been included within concerns on psychiatric and neurologic aspects of war. We hope that the papers provide both current and promising approaches to issues that need scientific knowledge and its implementation. The following materials are organized in the themes of the conference with information on invited presenters, to provide a sense of the broad backgrounds of the participants.

Many contributors have worked extensively with veterans and offer a lively discussion across dimensions from the biological to the psychosocial. We hope our readers will agree the presentations are in the tradition of the ARNMD as a path-leading source of knowledge.

**Broad perspectives: new approaches to prevention of mass conflict, the minds of warriors, jihadists, and political extremists**

The core issue is how humanity can prevent mass violence and genocide. Much has been written describing humankind’s horrible history of demonizing others. There has been little consideration to ways to prevent these aspects of savagery. The keynote speaker, David Hamburg, was president of the Institute of Medicine, then subsequently president of the Carnegie Corporation and co-chair of its Commission on Preventing Deadly Conflict. He has chaired separate special commissions of the United Nations and the European Union on genocide and has received the Presidential Medal of Freedom. His approach takes lessons from public health and behavioral sciences, further developed during the past decade as a DeWitt Wallace Distinguished Scholar at Weill Cornell. He has authored several volumes including *Preventing Genocide* and, with Dr. Beatrix Hamburg, *Learning to Live Together*, which deals with teaching children not to hate. He emphasizes the new dangers of the 21st century, including the easy availability of weapons of mass destruction and proposes a series of pillars of prevention including ways of providing help to troubled nations, fostering democracy, aiding equitable socioeconomic development, education starting at the earliest stages, mechanisms to reduce human rights violations, and training in preventive diplomacy. He focuses on proactive steps rather than waiting till conflict has become unmanageable, and on how each step can become a new reality.

While the dominant effort in psychiatry has been to tend to the wounds of the warrior, the nascent field of political psychiatry has endeavored to understand the mind of the warrior, on both sides of the conflict. What motivates a fellow human being to aspire to terrorism and to sacrifice his life as a martyr to advance the cause of his people? Jerrold Post, a psychiatrist and political scientist, now a professor of clinical psychiatry at George Washington University, is a founder of modern political psychology and has authored several significant and well-received volumes. Much as Hannah Arendt startled readers with her thesis regarding the banality of evil in World War II, Dr. Post unsettles by suggesting the apparent normalcy of a terrorist when placed in the appropriate social and historical context.
insights suggest a series of strategies to diffuse terrorism that may prove critical for consideration by policy makers. Political extremism within a nation can lead to violence including the threat of terror and provides a model that may have applicability to the study of divisions within and between cultures. Using an Israeli population, a view of this problem is provided by Nathanial Laor, professor of psychiatry and philosophy at Tel Aviv, clinical professor at the Yale Child Study Center, and director of the Cohen-Harris Center for Trauma and Disaster Intervention in Israel, who has written extensively on trauma and resilience. He and his colleagues look at the mind of extremists, building upon a stress and trauma model using research to compare persons from the far left and far right political wings. They demonstrate the powerful play of ideological and morbid transcendence with the finding that both political extremes report threat, though their type and content differ. Of great importance is the question, Who are the young men and women who choose to defend our nation? At a time when military service is voluntary, insight into this unique group is imperative and may lead to further insights that will allow us to develop more effective training and support of our warriors. In Jonathan Shay’s approach, our warriors are likened to the familiar heroes from the Homeric epics, *The Iliad* and *The Odyssey*, providing the foundation for a hermeneutics of healing. A psychiatrist, Dr. Shay has worked with veterans in a Veterans Health Administration hospital and has been the recipient of a MacArthur Foundation Award. For the conference, Matthew Bogdanos, Colonel, U.S. Marine Corps; homicide prosecutor, New York City; recipient of the National Humanities Medal; and winner of the Bronze Star, provided an account of aspects of the mind of current American warriors and their multiple roles, including efforts to rebuild society. In this case, the exhilarating and dangerous effort to find and bring together artifacts removed from the museum in Iraq is described in a compelling volume that he authored. The symptoms of comorbid mental health conditions such as PTSD or depression (associated with intrusive thoughts, concentration difficulty, and poor sleep) interfere with normal cognitive functioning. On the other hand, the cognitive impairment and emotional control problems associated with TBI are likely detrimental to the resilience essential to overcome PTSD. Thus, the warrior with TBI and comorbid PTSD or depression presents a complex clinical picture challenging us to develop strategies for accurate differential diagnosis and therapeutics. The presentations illuminate problems in diagnosing and treating TBI and challenges in living facing warriors who have suffered TBI. The change in emphasis from direct penetrating traumatic injury to closed traumatic injury in warriors is presented by Louis French, M.D., chief of the Traumatic Brain Injury Center at Walter Reed. He notes the high percentages of individuals with these problems, including as many as 20% with concussions and considers the still uncertain issues with the designation of “blast” injuries, the wide range of comorbid problems, as well as emotional and cognitive difficulties, including PTSD. The cross-cutting paper of Thomas McAllister, Millennium Professor of Psychiatry and director of neuropsychiatry at Dartmouth considers problems in adequately characterizing the range of psychological and TBIs as a prelude to developing effective treatment strategies. The paper raises the question of what neuropsychiatric after effects are associated with which type of trauma and demonstrate that chronic effects are associated with a significant overlap of symptoms. Jamshid Ghajar, professor of clinical neurosurgery, Weill Cornell, and director of the Brain Trauma Foundation, and his colleagues further illuminate the diversity of symptoms drawing from...
extensive preclinical and clinical research with civilians who have experienced TBI with a particular emphasis on mTBI. They unify the range of symptoms through brain imaging and behavioral studies including visual tracking and note the widespread specific microstructural changes including damage to frontal white matter tracts caused by shearing injuries. They propose specific rapid tests that may lead to better diagnosis and therapeutic interventions.

Psychiatric aspects of war

Recent Institute of Medicine (IOM) reports, commissioned by the Department of Defense (DoD) and the Veterans Administration (VA), concluded that the evidence base for the treatment of PTSD is severely lacking. They noted that only one psychological intervention, prolonged exposure therapy, had sufficient data to warrant consideration as a first-line treatment for PTSD. “Exposure therapy” refers to behavioral and cognitive behavioral treatments that involve confronting feared but safe thoughts, images, objects, situations, or activities to reduce pathological (unrealistic) fear, anxiety, and anxiety disorder symptoms. No pharmacological treatments have been deemed efficacious to date, though clinicians have believed that some seem to be helpful in certain patients. A review suggests that less than 50% of patients improve with selective serotonin reuptake inhibitors, the only class of medication with Food and Drug Administration approval for the treatment of PTSD. Taken another way, the data suggest the possibility of subtypes of illness with different neuronal and psychological mechanisms that could ultimately lead to more specific treatments. Information dealing with the current status and new developments of pharmacological and psychological treatments of PTSD was given throughout the sessions on psychiatric aspects by Professor Charles Marmar, former president of the International Society for Traumatic Stress Studies and currently chair of psychiatry at New York University; he is noted for his comprehensive scholarly work on the mental health impact of combat and moderated those sessions with a magical touch. Judith Cukor, assistant professor of psychology in psychiatry at Weill Cornell provides a cogent summary of both the current evidence-based treatment approaches for PTSD as well as promising psychotherapeutic and psychopharmacological treatments that are in the nascent stages of developing a persuasive evidence base.

If we look to the recent history of the disciplines, dealing with PTSD, the state of these fields is not surprising. Nancy Andreasen, professor of psychiatry at the University of Iowa, a recipient of the Presidential Medal of Science, was one of those key to development of the formal concept of PTSD and its incorporation into the Diagnostic and Statistical Manual of the American Psychiatric Association. She presents an engrossing history of a long-standing concept based on many types of stressors that has only been in the formal diagnostic nomenclature for a short time. As recently as the Vietnam War, the diagnosis of PTSD was the subject of vitriolic debate. The psychotherapeutic community’s emphasis on intrapsychic events was not yet tempered by empirical advances in the clinical and preclinical sciences in psychiatry. The zeitgeist in clinical psychiatry and psychology has shifted toward greater acceptance of the legitimacy of the diagnosis of PTSD and from an emphasis on the theoretical to an emphasis on the empirically substantiated, opening the door to the potential to teach the next generation of clinicians from a vastly improved evidence base.

A keynote overview of PTSD and traumatic stress has been provided by Robert Ursano and his colleagues. Professor Ursano, chair of psychiatry, Uniformed Services University, heads the Center for the Study of Traumatic Stress. They present extensive data demonstrating the substantial rates of behavioral alterations, including PTSD, due to war exposure. The paper provides information on the impacts of disorders including depression, suicide, and aggression/violence—major problems that influence not only the veteran but their families and loved ones. Some potential biological factors and biomarkers that might lead to new treatments and diagnostic methods are presented as well as psychological treatments, including psychotherapy.

The topic of evidence-based treatments for PTSD and new directions in such treatments has been covered by Judith Cukor and her colleagues. She has worked with patients from a wide range of severe trauma situations and has worked with the Army and Air Force providing training in specialized treatments for PTSD. The paper includes multiple approaches within both biological and psychological modalities and combinations of those methods as well as emerging possibilities. The authors include
a useful discussion of the barriers to the implementation of evidence-based treatments.

Although PTSD is one of the most common psychiatric problems consequent to war, others are also important. The RAND survey found that 18.5% of returning service members met criteria for either PTSD or depression.

Unlike PTSD, where a paucity of treatment options is the norm, there are numerous effective psychological and pharmacological interventions, as well as the combination of approaches for the treatment of various forms of depression. Both cognitive behavioral therapy and interpersonal psychotherapy have substantial empirical support as having a role in the treatment of some forms of depression across the adult lifespan, and many other forms of psychotherapy are under study in controlled experiments. There is a wealth of pharmacological alternatives including drugs that may act on various neurotransmitter systems or other fundamental neuroregulator processes. Multiple studies have documented successful strategies with first-line antidepressants. Other biological treatments including electroconvulsive shock and emerging techniques involving various forms of brain stimulation are under investigation and use. Examples of other methods include light therapy, sleep deprivation, as well as new classes of medications based on cellular communication processes, various hormonally based medications, and novel rapid-acting drugs that act on specific neuronal systems, such as ketamine. Again, more needs to be known as to the varying subtypes of illness to define new diagnostic criteria and new treatment approaches and to determine biomarkers that will help to predict which treatment or combination of treatments will prove most effective with a given patient.

Despite available treatments that are effective in many patients, less than half of those in need of care seek it, underscoring the added need to develop strategies to overcome barriers to care, such as stigma. Issues of psychiatric disorders in veterans and their families including depression, anxiety, suicide, psychosis, and substance abuse with particular attention to peer-to-peer treatment programs are considered by John Greden and his colleagues. Professor Greden is professor and former chair of the Department of Psychiatry at the University of Michigan, founder and director of the National Centers for Depression, and is a scientific founder and site director of the Welcome Back Veterans Initiative. Psychosocial solutions discussed include the Buddy-to-Buddy program that offers a strategy targeted toward reducing the stigma of mental illness and suicide prevention. In this peer-to-peer model, as developed with the Michigan National Guard, every soldier returning from OIF/OEF is contacted by peers identified by the Guard leadership and trained by clinical staff from the University of Michigan. It is hypothesized that such models may ameliorate the stigma of mental illness and motivate soldiers for treatment thereby bridging the chasm between returning soldiers and the available systems of care, such as VA and DoD facilities. They have developed methods for reaching large numbers of individuals in a model private–public partnership.

Issues of suicide in those who have served in the recent operations in Iraq and Afghanistan are considered by Martha Bruce, professor of sociology in psychiatry at Weill Cornell and a member of the VA Blue Ribbon Panel on Suicide Prevention. She offers her perspective as a leading expert in health services delivery on strategies for the prevention of suicide. Suicide has a significant association with PTSD, depression, and TBI and is a significant concern, highlighting the need to develop suicide prevention strategies. Since 2003, rates of suicide in active military personnel have been increasing and surpass age- and gender-matched nonveterans. The VA is undertaking special programs toward suicide prevention and those are described, including the barriers and problems with their implementation.

The options for treatment of PTSD and for comorbid conditions, such as depression, make the issue of stigma and impediments to care more apparent as highlighted by Steven Lindley and Alan Schatzberg and their colleagues from Stanford. Lindley is director of outpatient mental health of the Palo Alto Hospital, a faculty member at Stanford, and a member of the Stanford node of the Welcome Back Veterans Initiative while Schatzberg is Norris Professor and has been chair of psychiatry at Stanford, has served as president of the American Psychiatric Association, and is a scientific founder and site director of the Welcome Back Veterans Initiative. Their paper highlights the characteristics and predictors for seeking or not seeking help including factors ranging from nature of the provider to diagnosis, with depression being particularly problematic. The work emphasizes the importance of
close continual monitoring to reveal ways to improve care.

**New technologies: from media to telecommunications to developments in psychology and biology**

Technological advances provide examples of ways to change the paradigms of understanding and of dealing with severe neuropsychiatric disorders. Promising research follows the theoretical line of inquiry that views PTSD as a disorder of learning and plasticity. Early results from one area of investigation center around enhancing exposure therapy with virtual reality simulations of combat-related trauma to facilitate emotional engagement and extinction learning. Two papers present this approach. Albert Rizzo, associate director of the Center for Creative Technologies and research professor of psychiatry at the University of Southern California, provides background on virtual reality methods to treat PTSD and describes the use of customizable virtual scenarios, such as a convoy or a city situation, in a successful open clinical trial. Barbara Rothbaum, professor of psychiatry and director of the Trauma Recovery Center at Emory University in Atlanta and colleagues provide information on methods leading to virtual reality methodology and its potential uses including versions suitable for specific trauma situations. Advantages and disadvantages are presented including the ability to control the exact “dose” of therapy and high acceptance among the “digital generation.” In a radical departure from the conventional use of psychopharmacological agents, early data using d-cycloserine (an antibiotic approved decades ago to treat tuberculosis that we now know acts on specific neuronal systems) to enhance the effects of exposure therapy is also presented.

Another advance in electronic technology is demonstrated by the use of telemedicine as presented by JoAnn Difede and her colleagues. She is associate professor of psychology in psychiatry and director of the program for Anxiety and Traumatic Stress at Weill Cornell and a scientific founder and co-site director of the Welcome Back Veterans Initiative. Rizzo, Reger, Rothbaum, and Difede recently received the American Psychological Association Trauma Division “Award for Outstanding Contributions to the Practice of Trauma Psychology” for their work developing, testing, and disseminating the virtual reality-based treatment for combat-related PTSD. Rural Americans enlist in the military and serve at much higher rates than urban Americans, disproportionately representing today’s veteran population. Veterans in rural areas who need mental health services are much less likely to have access to care. They describe links to provide care in remote regions with potential solutions to a range of problems.

National shortages of trained mental health clinicians, coupled with this increasing number of U.S. service members requiring mental health treatment, are driving the need for the development of innovative technologies, such as telemedicine, as well as research to demonstrate its efficacy as a treatment modality. The increasing number of military members in need of mental health care demands the development and use of novel vehicles to deliver quality psychological therapies, regardless of clinician and patient location. Telemedicine technologies offer a unique potential to expand services to those in great need. While now broadly accepted in concept, telemedicine is a recent new technology with potential to impact large numbers of persons with serious problems.

While technology has changed warfare, both how it is waged and the consequences suffered by those who wage it, the history of innovation is marked by resistance to change. Though the human capacity for imagination allows us to envision uses of technology to solve extant problems, such as access to care, education of medical providers, and development of new treatments, our resistance to change remains among the most significant impediments to their implementation. Yet, several studies have noted the resistance to the use of telemedicine and evidence-based treatments on the basis of myths and fears, not on any hard evidence pointing to their detrimental nature.

Biological advances include transformative technologies for mental illness. The power of brain imaging technologies, which depend upon electronic, mechanical, mathematical, statistical, and behavioral advances to study brain activity, is being applied to problems, such as PTSD. Michael Roy, Colonel, Medical Corps, U.S. Army; director, division of military internal medicine, and professor of medicine at the Uniformed Services University and his colleagues provide encouraging data using functional magnetic resonance imaging with suggestive early evidence of improvement of cerebral function.
following completion of evidence-based treatments for PTSD. Combined with other studies using brain imaging in these proceedings, the results underscore the potential of the emerging forms of imaging technology.

Technologies involving genetics and molecular neurobiology are bursting forth with expectations of applications to neuropsychiatric disorders. Francis Lee is a recipient of a White House Award for Excellence, a psychiatrist and neurobiologist, and vice-chair for research at Weill Cornell. He and his colleagues provide a theoretical model of an approach centered on the fact that it is currently impossible to predict who will respond to therapeutics. The model is based on genetic variants of the gene encoding brain derived neurotrophic factor. The investigators have shown links to anxiety and learned fear memory in studies in mice and humans, behaviors core to PTSD. They propose a nascent foundation for a differential therapeutics of PTSD that may lead to the ability to match a patient to the appropriate treatment on the basis of their genetic profile before the treatment is undertaken. In broad perspective, such work is likely to lead to a paradigm shift in neuropsychiatric diagnoses and treatments.

In a far reaching presentation, Rachel Yehuda, professor of psychiatry and neurobiology and director of the Traumatic Stress Studies Division of Mount Sinai School of Medicine, provides an elegant methodology for the discovery of biomarkers for PTSD, which will hopefully lead to a more precise diagnostic picture and targeted treatments. She and her colleagues ask core questions dealing with the potential of using biological markers to inform clinically meaningful treatment response. They ask about the comparison between PTSD in civilian populations and veteran populations where the criteria and outcomes seem quite different, areas that call out for further study. They note the poorer responses to treatment in the veteran population. They consider the range of possible biological markers including hormonal and stress measures and the issues involved in correlating multiple biological and behavioral markers in a variety of populations and illness presentations at different time points. The framework that is presented has the potential to lead to new diagnostic systems and improved and specified treatments.

Final conclusions and perspectives

A range of strategies was discussed in the conference and this symposium volume that offer hope. In his summary, David Silbersweig, a psychiatrist, neurologist, clinical neuroscientist, specialist in functional brain imaging, and now chair of psychiatry and director of the Neuroscience Initiative at Brigham and Women’s Hospital of Harvard, provides an integration of the broad data sets we will need to advance these important problems. In his presentation, the various anatomic areas involved in patterns of symptoms are considered and the possibilities for new diagnostic schemes that also include genetics and behavior become clearer. In this powerful look at the future, he also considers ways in which later behavior is impacted.

Our “marching orders” are clear. We need to work on broad, overlapping issues of war at the same time that we support work on specific neuropsychiatric problems. The conference could touch on only a few of the broader issues that represent the tip of the iceberg. Many important topics require further inquiry, such as impacts of war on large human populations and the experiences of refugees, families, and survivors whether or not they have been in battle. We as professionals in clinical neurosciences with knowledge of aspects of behavior—and we as members of a civilization—will need to consider issues in the domain of the social sciences including group psychology, sociology, economics, political science, and international relations as well as their interaction with issues of public health and public policy. Those efforts have often been neglected by persons in our domains but are now critical to a new concept of public health that has become central to all areas of medicine. Research, scholarship, and implementation in those areas must deal with the multiple societies and their components that make up our current world and that can influence the likelihood of conflict. Such study will require intense effort and courage but is already being undertaken in an encouraging and surprising development by persons associated with the medical field—as seen in the proceedings, we have much to offer and can influence policy. The problems of societies, cultures, and individuals (including the impacts of severe personality disorders in leaders or followers), must be dealt with if we, as humans, are to survive—thus
the rationale for the broad perspective of this conference on psychiatric and neurologic aspects of war. As described in the concluding chapter and from the proceedings as a whole, taking the issues of specific neuropsychiatric problems, one of the striking themes is the likelihood of subtypes of the illnesses including PTSD, depression, and TBI. The finding that only a few are helped by treatments could be an important clue, indicating one or more subtypes that are specifically helped. The goal must be to identify markers that permit determination of the biological and psychological subtypes for each illness including the neuronal mechanisms, such as multiple learned fear pathways, and to find the biological and psychological treatments or combinations of therapies that aid specific subtypes. Developing technologies of all types will have dramatic impacts as is already being seen for PTSD and depression. For TBI much of the current work involves refining diagnosis and mechanisms but new technologies including cell growth, migration, remodeling, stem cells, and brain stimulation, as well as new behavioral mechanisms and re-learning may dramatically change the outcome. The overall paucity of interventions requires a major effort in each of the disorders to rectify this shortcoming as noted by our contributors.

The degree of overlap, comorbidity, in the same individual between one or more induced neuropsychiatric or behavioral conditions—concussion, mild or severe TBI, cognitive problems, PTSD, anxiety, depression, demoralization, family problems, aggression, and suicide—calls out for further integrated study. The specific neuropsychiatric issues must be studied separately and together at basic, translational, and clinical levels, in order to best help veterans and their families.

Much as the U.S. military partnered with private universities, such as New York City’s own Rockefeller University, to solve the crisis created by the pandemic flu outbreak during World War I, a partnership between academic medical centers and government agencies should be developed to address current problems. This new knowledge will have enormous impacts also on neuropsychiatric diagnosis and treatment for entire populations. Thus, in collaboration with government institutions, such as the VA and the DoD, we must endeavor to bring the unparalleled research and clinical resources of university medical centers to bear on the neuropsychiatric problems confronting warriors and their families.

Conflicts of interest
Jack Barchas owns stock in Lilly, Elan, and Neuocrine.

References


