

INVITED PERSPECTIVE

Expanding Advocacy for Head Trauma Vision Research Funding

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ABSTRACT

In this article, we explore the roles of media, research, and advocacy in education and research funding. All three have played critical roles in advancing our understanding of eye, vision, and brain injuries in sports and in the military.

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Key Words: brain injury, vision, eye trauma, research, clinical practice, media, advocacy

There is increasing alarm about military- and sports-related head injuries and the common involvement of eye and vision complications. Indeed, some sports head injuries, especially concussion, may well be assessed using eye and vision complications. Certainly, the public has become increasingly aware and concerned about the implications of concussion and brain injury in professional sports due to the increasing number of cases of permanent brain damage, as revealed on autopsy in celebrated cases. The same awareness and concern in collegiate and children's sports has resulted in proposals for soccer 'heading' and related age restriction proposals. Nevertheless, the majority of the research funding to date as a result of effective advocacy has been directed toward military-related head trauma. The issues here are quite significant and a real challenge to the affected service members and their post-duty Department of Veterans Affairs (VA) hospital care.

We primarily draw attention to the successful efforts to receive vision and eye-related extramural research funding from the Department of Defense (DOD). This research into head trauma with vision complications provides perspective on the research needs in the general environment, such as head injuries with significant vision complexities in civilian applications, such as accidents and sports at all levels. The defense-related vision advocacy efforts illustrate how interested parties may proceed in soliciting broader vision research involvement and support.

Departments of Defense and Veterans Affairs Background

Vision trauma has been a signature injury of the conflicts in Iraq and Afghanistan, in addition to traumatic brain injury (TBI) that also causes vision dysfunction, hearing loss, posttraumatic stress disorder (PTSD), and loss of limbs. Over 344,000 military TBIs have occurred as of the latest report.¹ As these service members are eligible for VA care, the numbers present a challenge with respect to their medical and rehabilitation needs. In addition to the VA's clinical and research activities, Congress funds each year a dedicated Peer Reviewed Vision Research Program (VRP) in the Defense spending bill to address DOD-identified research gaps. The vision community has worked with the media to emphasize the importance of funding research into these devastating deployment-related eye injuries as a means to ensure Congressional action. Most recently, it has also used the increasing body of evidence about the similarities between TBI-related visual dysfunction and ocular pathology resulting from sports-related concussive injuries (and concussive injuries in general) to further engage the media in educating the public to garner greater grassroots support for VRP funding.

VRP Background

The VRP was created by Congress in Fiscal Year (FY) 2009 DOD Defense Health Programs appropriations and has since funded 67 vision researchers for a total of \$50 million—with another \$18 million in combined FY2015/2016 funding expected to be awarded in June 2016. Originally funded at \$4 million annually, since FY2013 the VRP has been funded at \$10 million each year, with the FY2017 House of Representatives Defense

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Appropriations bill proposing an increase to \$15 million. In addition to this funding stream, DOD's dedicated TBI Program—which is funded at \$120 million annually—transfers about \$5 million each cycle to the VRP to fund TBI-related vision dysfunction research. As a result, the field of vision trauma research has grown dramatically, with the Congressionally Directed Medical Research Program (CDMRP, the DOD division that manages the VRP) estimating that, as of 2015, the FY2009–2012 VRP funding cycles have resulted in more than 80 published papers that are advancing the field of traumatic eye injury diagnosis and treatment. This theme issue of OVS adds to that body of knowledge.

VRP Advocacy is an Ongoing Communications Process

Because funding for the VRP and other deployment-related injury research within Defense Health Programs is not built into the base DOD budget, Congress must proactively add this funding to Defense appropriations each year. As a result, Capitol Hill advocacy is vital. As early as FY2006, the National Alliance for Eye and Vision Research (NAEVR, the vision community's research advocacy organization) compiled statistics (Fig. 1) that described why deployment-related traumatic eye injury from penetrating wounds and TBI-related visual disorders rank second only to hearing loss as the most common injuries among active military engaged in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF).

In 2012, a NAEVR-funded study entitled *Costs of Military Eye Injury, Vision Impairment, and Related Blindness and Vision Dysfunction Associated with Traumatic Brain Injury without Eye Injury* estimated—for the very first time—the costs of military eye trauma.² Based on published data from 2000 to 2010, the study reported that deployment-related eye injuries and blindness have cost the United States \$2.3 billion a year, yielding a total of \$25.1 billion, driven primarily by the net present value of long-term benefits (VA and Social Security), lost wages, and family care. These data have been extremely helpful in supporting NAEVR's contention that research to effectively treat vision trauma and TBI-related visual disorders can have long-term implications for an individual's vision health, productivity, and quality of life. For many young blinded soldiers, this could mean upwards of 60 or more years.

Although useful, these data do not put a face to the eye-injured soldier. So, NAEVR has engaged the Blinded Veterans Association

- Traumatic eye injuries have accounted for upwards of 16 percent of all injuries in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF)
- Male soldiers ages 20-24 account for 97 percent of visual injuries
- Eye-injured soldiers have only a 20 percent return-to-duty rate as compared to an 90 percent rate for other battlefield trauma injuries
- Upwards of 75 percent of all TBI patients experience short- or long-term visual disorders, such as double vision, light sensitivity, inability to read print, and other cognitive impairments.

FIGURE 1.

Impact of deployment-related traumatic eye injuries.

(BVA) as an important advocacy partner. Although NAEVR and its member professional societies such as the American Academy of Optometry, American Optometric Association, the American Academy of Ophthalmology, and the Association for Research in Vision and Ophthalmology (ARVO) have emphasized the importance of VRP funding for researchers, the BVA has added the “patient's voice” to identify the lifetime implications of a deployment-related eye injury—and the promise of research to ease that burden.

A critical component of annual VRP advocacy is BVA's hosting of blinded veterans in Capitol Hill visits—especially those who reside in states/districts of Members of Congress with key Committee assignments, such as Defense Appropriations, Veterans Affairs, or Armed Services. In these discussions, blinded veterans discuss how VRP-funded research might have potentially avoided/mitigated their eye injury or may currently be helpful, especially in dealing with the lingering impact of TBI visual dysfunction. These veterans also describe their care by VA, the effect of vision impairment on their future plans regarding education and career, and the impact on their family and support system. The engagement of blinded veterans in Congressional visits, and in other BVA programs such as Project Gemini (Fig. 2), also provides useful training for these individuals in speaking with the media.

For many years, NAEVR and BVA have pitched articles to both the military and popular press highlighting the incidence and impact of deployment-related eye trauma injuries and need for VRP funding to address vision research gaps, with blinded veterans offering their perspectives. Although most Americans are familiar with the terms PTSD and TBI, many are unfamiliar with TBI's visual implications, so it is an ongoing educational process. In other cases, NAEVR and BVA have reached out to the media to emphasize that the level of VRP funding is still relatively small when compared to other DOD programs and needs full support by Congress. This has been especially important in years when Congress was considering cuts to the Defense Health Programs or to eliminate that funding stream entirely.

Increasingly, NAEVR is also emphasizing to the media that, although VRP research immediately addresses deployment-related eye injuries, what it discovers could ultimately apply to civilian eye trauma from accidents and to visual implications from TBIs or sports-related concussive injuries. For example, VRP-funded research has led to the development of a portable, hand-held device to analyze the pupil's reaction to light, enabling rapid diagnosis of TBI-related visual dysfunction on the battlefield.³ It has also funded an “ocular patch” of a nanotechnology-derived reversible glue that seals lacerations of the eye on the battlefield, protecting it while a soldier is transported to a more robust medical facility where trained ocular surgeons can properly suture the globe.⁴ The VRP has also funded development of a drug-delivering contact lens which may offer significant advantages to existing drug delivery means such as eye drops.⁵ Each advance is as applicable to sports and other civilian injuries as it is to military applications.

Increasing Public Awareness of Sports and Military TBI Similarities

Although widespread media reports of the long-term consequences of multiple sports-related concussive injuries began appearing in 1999,⁶ it has just been in the past few years that



FIGURE 2.

Project Gemini group image in front of Buckingham Palace. Under the auspices of its Operation Peer Support program—which brings together blinded veterans of recent conflicts with those who lost their sight during the Vietnam, Korea, and World War II eras—each May, BVA participates in Project Gemini. In this exchange program with Blind Veterans United Kingdom (BVUK), founded in 1915 and formerly known as St. Dunstan's, blinded U.S. veterans visit and interact with blinded U.K. veterans, discussing blind rehabilitation, readjustment training, adaptive technology, and vision research. They also compete in athletic events (e.g. archery, cricket, and bowling) and visit local historic sites where they are permitted to touch objects being described, such as armor, jewels, and architectural details. BVA and BVUK each reach out broadly to their respective national media to cover this event. In the image above from 2015, the participants attended a 100th anniversary event for BVUK held at Buckingham Palace.

researchers have discovered the similarities between chronic traumatic encephalopathy (CTE) from repetitive concussion and the tau protein buildup in Alzheimer's disease⁷ and the visual symptoms associated with TBI.⁸ In 60% of studied CTE cases, there is evidence of visual symptoms including blurred vision, double vision, vision loss, or light sensitivity.⁹ Indeed, there seems to be significant overlap between visual dysfunctions (e.g. in accommodation, vergence, saccades) after sports concussion¹⁰ and those seen in veteran and military populations.¹¹ Recognition of the potentially severe impact of concussion—especially repeated concussions—has led to basic vision research¹² and translational research. The latter, which applies basic research findings into practice settings, seeks to better guide diagnosis to improve self-reporting of concussions by children,¹³ broaden understanding and management of sports-related concussion,³ develop parent-administered vision tests to improve diagnosis in children engaged in athletics as young as 5 years of age,¹⁴ and study the effectiveness of legislation aimed at improving the understanding and diagnosis of sports-related concussions.¹⁵

In an effort to more broadly educate about the parallels between concussive sports injuries and deployment-related TBI, ARVO has hosted *Veterans and TBI* sessions at its 2013, 2015, and 2016 annual meetings, which draw attendees from around the world. Open to the public, streamed on its Web site, and pitched to the media, the sessions have featured the latest research into concussive and TBI-related injuries. Working with BVA, the sessions have included perspectives from blinded veterans and attendance by staff from district offices of Members of Congress.

Implications for the Future

Congress's intent to fund the VRP in FY2017 at \$15 million is an encouraging sign. This continued—and expanded—support is

vital to further studies on the means to avoid or mitigate eye injuries, to better diagnose and treat TBI visual dysfunction, and to potentially restore “vision” in blinded soldiers. Because the vision community will continue to broadly advocate for and educate about the importance of VRP funding, it invites every voice to reach out within academic institutions, to the community, and to Congress because what we learn from those researching these injuries can be applied so broadly.

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