DEFENSE-RELATED VISION RESEARCH FUNDING

Since it was created by Congress in FY2009 DOD appropriations through NAEVR advocacy, the VRP has awarded 60 grants totaling $45 million to vision researchers. Research projects funded in the first two VRP funding cycles (2009-2010 and 2011-2012) have resulted in 80 published papers that are advancing knowledge about the diagnosis and treatment of eye trauma injuries.


In October 2014, DOD’s Congressionally-Directed Medical Research Program (CDMRP), which now manages the VRP, made notifications to researchers about FY2013 grant awards—13 Translational Research Awards (funding up to $1 million) and 9 Hypothesis Development Awards (funding up to $250,000), for a total of $15.2 million. Although the CDMRP is still finalizing FY2014 awards, as of mid-March 2015 it has announced six awards for a total of $5.2 million.

FY2015: Program Announcement Expected Shortly

In December 2014, Congress finalized FY2015 DOD appropriations with passage of the “CROMibus” spending bill, which funded the VRP at $10 million. The CDMRP is currently developing a Program Announcement and anticipates releasing it shortly. NAEVR and ARVO will alert researchers when the announcement is released.

FY2016: NAEVR Requests VRP Funding at $15 Million

NAEVR, working with the Blinded Veterans Association (BVA), ARVO, the American Academy of Ophthalmology, and the American Optometric Association, has been advocating with Congress for VRP funding at $15 million—the highest level ever and an increase of $5 million over the previous three years each of $10 million appropriations. Highlights include:

• In February 5 letter, BVA was joined by 11 other Veterans Service Organizations (VSOs) and Military Service Organizations (MSOs) requesting FY2016 VRP funding at $15 million.
• In early March, Army magazine, a publication of the Association of the United States Army, had an article which described the potential long-term

DOD-Funded Researcher Studies TBI-Related Photophobia

On March 18, AEVR hosted a deployment-related vision trauma research Congressional Briefing entitled Understanding Light Sensitivity in Patients with Traumatic Brain Injury (TBI) featuring clinician-scientist Andrew Hartwick, O.D., Ph.D. (Ohio State University College of Optometry). Funded through a Hypothesis Development Award from the DOD’s VRP, his research addresses a major DOD-identified gap: the lack of understanding of the physiological causes of photophobia, or light sensitivity. Photophobia is a symptom frequently reported by troops who have suffered a TBI resulting from exposure to the blast from an Improvised Explosive Device (IED). Other visual symptoms of TBI include loss of focus, oculomotor deficits, and visual field deficits. TBI is the most prevalent warfighter injury, with 300,000 soldiers experiencing it between years 2000-2014. It is also a common cause of injury in the civilian population, resulting from falls, automobile accidents, and sports-related injuries.

Dr. Hartwick’s research focuses on intrinsically photosensitive retinal ganglion cells, or ipRGCs, which are cells in the eye that are particularly sensitive to blue light. They express the photo-pigment melanopsin and play a key role in a number of non-visual functions, including the regulation of the body’s circadian rhythms. He theorized that exposure to a TBI caused these cells to “overreact” to light, thereby signaling to the brain that ambient light levels are brighter than they actually are. In a previous study, done in collaboration with Satchin Panda, Ph.D. (Salk Institute) and other researchers, evidence from experiments on young mouse pups supported a role for ipRGCs in photophobia. The young mice “froze” and stopped moving when exposed to light but, after being injected with a compound that inhibits melanopsin function, this light aversion behavior was no longer present.

Dr. Hartwick’s current DOD-funded research focuses on individuals who have been diagnosed with “mild” TBI, meaning that they were not in a coma after the injury and who had also experienced chronic photophobia for a minimum of six months. A central problem for clinicians is lack of an objective tool to measure the extent of photophobia that patients experience; they are simply asked if exposure to light causes them any discomfort. With his team, Dr. Hartwick initiated the Head Injury-associated Photosensitivity and Pupillary Function (HIPPF) study to evaluate whether exposure to a TBI caused an alteration in the ipRGC contribution to light-evoked pupill constrict. A total of 40 subjects were enrolled in the study, including 28 TBI patients with photophobia and 12 control subjects. The researchers exposed subjects to alternating flashes of blue and red light and measured the change in pupil size during the light pulses and the rate at which the pupil re-dilated during the intervening dark periods. As ipRGCs continue to respond for many seconds after light offset, this later measurement provided an objective measurement of the signal relayed by these cells to the brain center responsible for regulating the pupillary light reflex.

The data suggest that ipRGCs were not hypersensitive to bright light in the subjects with TBI- associated photophobia, as originally theorized, but there was evidence for a change in the ability of ipRGCs to adapt to repeated light exposure in these subjects. These results support the premise that ipRGC function can be altered after TBI and this dysfunction can be detected using a short pupil test that is adaptable for clinical use. With a better understanding of the physiological processes in the eye that are causing the photophobia, the next step is the development of a therapeutic intervention that could “re-set” the ipRGCs to return to a normal response to light. In particular, many of the subjects experienced some level of relief from their photophobia through the use of relatively inexpensive orange-tinted glasses. Future research will further investigate whether this benefit is specific to certain tints and examine the effect of long-term wear of these glasses on ipRGC function.

Newsflash:

NAEVR’s James Jorkasky

For more information and to follow NAEVR on Twitter, Facebook, and LinkedIn, visit the Defense Related Vision Research section of NAEVR’s Web site for full details.