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Podcast 3

TRAUMATIC BRAIN INJURY (TBI) AND VISUAL DYSFUNCTION PODCAST

Introduction.

This series of podcasts is hosted by the Vision Center of Excellence, a joint program of the Department of Defense and Department of Veterans Affairs.

The podcast series provides concise summaries of issues and reports targeted to Department of Defense and Veterans Affairs vision providers overseeing care for our Service members and Veterans.

Body.

This podcast summarizes and comments on two articles published in 2013. The first article, titled “Mechanisms of TBI and Visual Consequences in Military and Veteran Populations” was authored by Dr. Gregory L. Goodrich and colleagues and published in *Optometry and Vision Science*. The second article, entitled “Visual Quality of Life in Veterans With Blast-Induced Traumatic Brain Injury” was authored by Dr. Sonne Lemke and colleagues and published in the *Journal of the American Medical Association for Ophthalmology*.

Traumatic brain injury, also known as TBI, is a significant injury that, according to the Centers for Disease Control and Prevention, affects 1.7 million people in the U.S. each year. TBI is typically classified by both the type of injury, either blast or non-blast-related, and severity, which can be mild, moderate or severe. Symptoms vary greatly depending on the cause and type of TBI, and visual dysfunctions are a common associated consequence. Injuries that result in moderate and severe TBI, both blast and non-blast-related, may cause structural damage to the eye, facial lesions or swelling in the brain that can interfere with the visual pathways. Since WWII, this correlation has been documented and discussed within medical literature; however, even today the association has not been formally established. Individuals with mild TBI, or concussion, may not have apparent injuries and typically do not suffer the same degree of anatomical damage to the eye or brain, but may still experience visual disturbances. These co-occurring conditions can have a significant functional impact on the lives of Service members and Veterans.

In the study by Dr. Goodrich and colleagues, the purpose was to determine if the type of vision problems between patients with a blast-related TBI differ from patients with non-blast-related TBI. Medical records of 100 patients admitted to the Department of Veterans Affairs, Palo Alto Polytrauma Rehabilitation Center were reviewed. These included patients with either mild or moderate to severe, blast or non-blast-related TBI. Self-reported vision complaints, and vision and ocular data from eye examinations were also reviewed. Researchers found several similarities between the blast and non-blast-related TBI patients. For example, both groups had similar types of vision function deficits. 66 percent of patients with a blast-related TBI, and 69 percent of patients with a non-blast-related TBI, had one or more complaints about their vision, including double vision and trouble reading. Overall, 86 percent of blast-related TBI patients and 90 percent of non-blast-related TBI patients reported at least one oculomotor dysfunction, such as accommodative dysfunction, convergence insufficiency or strabismus. While both groups of patients experienced many of the same visual and oculomotor dysfunctions, two statistically significant patterns of dysfunctions emerged. First, more than **twice** the number of patients with a

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blast-related TBI reported light sensitivity, or photophobia, than those with a non-blast-related TBI. Second, patients with a non-blast-related TBI had higher rates of saccadic dysfunctions. The reasons for these outcomes are not well known and suggest the need for additional research to better understand the relationship between TBI, vision and oculomotor disturbances. The high incidence of defects and visual disturbances in both populations nonetheless demonstrates the need for thorough vision exams among Service member and Veteran populations with history of TBI.

The second study, led by Dr. Lemke and colleagues, evaluated questionnaires used to screen for visual quality of life in a sample of Veterans with documented blast-related TBI. These included patients with mild, moderate to severe, or penetrating TBI. The study evaluated the 25-item National Eye Institute Visual Functioning Questionnaire, or VFQ-25, and the Neuro-Ophthalmic Supplement, to determine their efficacy in assessing perceived visual functioning in patients with blast-related TBI. The VFQ-25 is a widely-used tool used to assess the effect of eye disorders on visual performance and quality of life. The Neuro-Ophthalmic Supplement evaluates visual problems related to neuro-ophthalmic disorders that are not specifically covered by the VFQ-25. These tools have been validated and are widely used in other patient populations with ocular and neurological disorders. However, prior to this study, neither tool had been used in a younger TBI patient population, making this the first study of its kind to use established visual quality of life questionnaires to assess self-reported visual satisfaction in patients with blast-related TBI.

60 patients with blast-related TBI were enrolled in this study and were administered both the VFQ-25 and the Neuro-Ophthalmic Supplement at baseline. 39 of the 60 underwent testing again at one year. The scores at both times were compared to established normative data from other patient groups. Visual quality of life scores were significantly lower in the TBI patient group than in samples of healthy patients or those with other eye diseases. Within the TBI patient group, participants with visual acuity, contrast sensitivity, or visual field defects reported significantly poorer visual quality of life than those without. Interestingly, visual quality of life scores did not differ between the mild, moderate, severe and penetrating TBI groups and were not dependent on whether the individual was wearing protective eye gear, or other blast experience characteristics. Both the VFQ-25 and the Neuro-Ophthalmic Supplement provide useful information on the visual quality of life for patients living with TBI and visual dysfunctions. The authors recommend that regular and thorough eye exams, including the use of visual quality of life questionnaires, be used to identify visual dysfunctions in individuals with a history of blast and non-blast related TBI.

Such data, as discussed in this podcast, underscores the importance of understanding the relationship between TBI and visual dysfunction. Whether military or civilian, TBI is common among all populations and can significantly affect an individual's visual and oculomotor functioning, as well as overall quality of life. Continued research, including controlled clinical trials, will help to emphasize the complex relationship between TBI-associated visual dysfunctions and visual quality of life. Research may also identify which treatments are most effective in speeding recovery, ultimately improving the overall vision health and quality of life in Service members and Veterans.

Conclusion.

This production was brought to you by the Vision Center of Excellence. Our mission is to lead and advocate for programs and initiatives to improve vision health, optimize readiness and enhance quality of life for Service members and Veterans. Working with TRICARE, the Military Health System, other Centers of Excellence and the Veterans Health Administration, the Vision Center of

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Excellence works to enhance collaboration between Department of Defense and Department of Veterans Affairs vision care providers, provide guidance for clinical practice and facilitate patient-centered support. For more information, visit us online at vce.health.mil or on Facebook.

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APPENDIX

A: Phonetic Guide.

Phonetic Guide		
1	Sonne Lemke	Sou - ni Lem - ki
2	Oculomotor	Ä - kyə - le - mo - ter
3	Saccadic	Sə - kahd - ic
4	Ophthalmic	Af - thæl - mic
5	Strabismus	Strə - ' biz - məs