factors and ways to reduce cognitive decline; discovery of the anti-MOG antibody in patients with demyelinating disorders and associated neuropsychological outcomes; advances in the understanding of congenital heart disease, the latest initiatives in the field, and discussion of neuropsychology's role in the care of these patients; and advances in targeted therapies for childhood cancer, risks associated with cancer and its treatment into adulthood, and an application of a developmental, lifespan approach in the care of childhood cancer survivors. Following each presentation, there will be an opportunity for discussion and questions. Upon conclusion of this course, learners will be able to:

1. Describe recent advances in medical care for pediatric sickle cell disease, demyelinating disorders, congenital heart disease, and cancer
2. Explain long-term neuropsychological outcomes in pediatric medical disorders
3. Assess the role of neuropsychology in advancing the field across pediatric medical disorders

Symposium 11: Military TBI: Neural and Clinical Correlates of Cognitive Function

3:30 - 4:55pm
Friday, 3rd February, 2023
Town & Country Ballroom B

Chair

Lars Hungerford
Traumatic Brain Injury Center of Excellence, San Diego, USA

Summary Abstract:
This symposium will highlight recent advances in understanding, assessment, and treatment of the effect traumatic brain injury has on cognitive functioning in military Service Members and Veterans. Since 2000, U.S. Service Members have sustained over 450,000 brain injuries, the majority of which are mild. Although TBI mechanisms and characteristics among Service Members can differ from civilians in significant ways, research being conducted at Department of Defense and Veterans Affairs sites to address this problem can also yield benefits to civilians with TBI. Four presentations will focus on various aspects of TBI evaluation and treatment based on findings from their own research. Dr. Mark Ettenhofer will present findings relating to promising new eye tracking measures and their relationship to standardized cognitive test results among Service Members with mild traumatic brain injury. Next, Dr. Victoria Merritt will examine the role of symptom attribution on treatment-seeking Veterans with a remote history of traumatic brain injury. In particular, Dr. Merritt will be examining both self-reported symptoms as well as performance on objective neurocognitive tests. Dr. Jason Bailie will describe an ongoing study comparing a novel approach to cognitive rehabilitation, Strategic Memory Advanced Reasoning Training (SMART), to traditional cognitive rehabilitation interventions in Active Duty Service Members. The results of this study have significant implications for treatment of all individuals with chronic symptoms following mTBI, regardless of military status. Finally, Dr. Jared Rowland will present findings on the influence of mild traumatic brain injury and blast exposure on the relationship between brain function, cognitive outcomes, and symptom severity in a sample of Iraq and Afghanistan combat veterans. This study will demonstrate how the relationship between aspects of the functional connectome and cognitive function are changed by TBI and blast. Overall, these studies highlight novel approaches to the understanding, assessment, and treatment of TBI being implemented in the Department of Defense and Veterans Affairs that have high applicability to the civilian population.

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1 Neurocognitive Correlates of Oculomotor Performance among U.S. Military Personnel with Mild Traumatic Brain Injury

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Objective: To examine neurocognitive correlates of oculomotor performance among U.S. military personnel with history of mild traumatic brain injury (mTBI).
Participants and Methods: A series of studies (total n=356) were conducted to examine saccadic eye movements and manual button presses collected in response to attention stimuli, and to compare these findings to the results of standardized neuropsychological tests. Study 1 included n=27 with remote mTBI and n=54 controls who completed the Bethesda Eye and Attention Measure (BEAM), an eye tracking task that was designed to measure visual attention and executive function. In Study 2, n=51 with chronic mTBI and n=33 controls completed the Fusion n-Back task, an eye tracking task that was designed to assess the impact of working memory load on visual attention performance. Study 3 examined psychometric characteristics of BEAM among n=191 military personnel with remote mTBI. In all studies, participants completed eye tracking tasks, a structured TBI diagnostic interview, and a brief battery of standardized neuropsychological tests.
Results: In Study 1, BEAM saccadic and manual metrics demonstrated strong reliability and high sensitivity to multiple cognitive cues designed to elicit spatial orienting, temporal alerting, executive interference, perceptual release (gap) and inhibition (η^2_p=.76, p<.001). However, corresponding saccadic and manual measurements were weakly related to each other, and only manual (not saccadic) measurements were related to estimated verbal intelligence or years of education. Standardized neuropsychological measures did not differ between groups, but mTBI participants were more likely to be impaired on saccadic metrics than controls.
In Study 2, Standardized cognitive measures and estimated premorbid intelligence were positively associated with all manual metrics from the Fusion n-Back test, but were not associated with mTBI history or with saccadic metrics. Fusion n-Back saccadic and manual metrics had strong reliability and complementary sensitivity to chronic mTBI, with combined predictive power of PPV=.78, NPV=.72, r^2=.44 for classification of remote mild TBI vs. controls on the more cognitively-challenging 1-back task condition.
In Study 3, BEAM metrics including manual RT latency and consistency, saccadic RT consistency, and saccadic inhibition errors showed consistent correlations with standardized measures of visual attention, processing speed, task switching, working memory, and executive functions. Hierarchical regressions showed that BEAM saccadic and manual metrics were independently predictive of cognitive test performance, above and beyond effects of demographic factors and clinical characteristics.
Conclusions: Results demonstrated some surprising findings related to neurocognitive influences on oculomotor performance. While both saccadic and manual performance were strongly and similarly influenced by attention cues, these two modalities were only weakly correlated to one another. Additionally, manual metrics were more strongly and consistently related to standardized cognitive test performance and premorbid intelligence than saccadic metrics. However, saccadic metrics demonstrated superior sensitivity to remote/chronic mTBI relative to manual metrics and standardized neuropsychological measures. Overall, these results suggest that saccadic eye tracking measures may provide unique value in assessment of mTBI and neurocognitive functions that is complementary with more common forms of assessment relying upon somatomotor response modalities.

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2 Examining the Role of Symptom Attribution on Neurobehavioral and Neurocognitive Outcomes in Treatment-Seeking Veterans with Remote History of Traumatic Brain Injury