

## mTBI Assessment of Visual Function

Objective testing to diagnose and treat Mild Traumatic Brain Injury (mTBI) is both costly and often times inaccessible. In this newsletter I will introduce a test that is cost effective, objective and reliable to assess one of the common findings associated with mTBI.

The first evaluation for a potential brain injury is in the emergency department where screening for concussion is performed using the Glasgow Coma Scale (GCS). In the context of a mTBI, the great majority of injuries will demonstrate a normal GCS score. The GCS is not sensitive for mTBI and is more suited for rapid acceleration contrecoup or high impact blunt trauma head injuries. Current tests for TBI include a physical exam with symptom reports, neurological testing such as the Standardized Assessment of Concussion or Defense Automated Neurobehavioral Assessment (DANA), and vestibular assessments such as the Balance Error Scoring System (BESS). A sensorimotor examination may also be part of a standard clinical assessment for concussion. When patients start developing cognitive and executive function difficulties, as well as the myriad of other TBI related symptoms, the battery of tests available are either too costly or are inaccessible as a screening exam. This results in many mTBI patients not being diagnosed properly or early enough to document and treat the head injury.

Advanced imaging using Diffusion Tensor Imaging (DTI) is not readily available to brain injured patients and is very expensive. Neuropsychological evaluations take many hours to days to perform and can cost as much as \$5,000-\$10,000 only to have negative or equivocal findings (and good luck finding a neuropsychologist to accept an LOP). Routine CT scans to assess for bleed or parenchymal injury are not very helpful for mTBI patients. Electroencephalography (EEG) is helpful primarily if a patient has seizure related symptoms. Quantitative EEG (brain mapping) has questionable value and may not be admissible as evidence due to conflicting scientific support. Cognitive testing like IMPACT or Cambridge Brain Sciences assessments are quite helpful in the early stages and periodically over time, but are of limited value as a standalone. Other tests like P300 and Evoked Related Potential may be helpful but are not very sensitive.

Assessment of oculomotor function is a sensitive and objective tool that can be used to identify cases of mTBI. The tests are not very expensive and are easily performed by patients regardless of the level of injury that exists. The testing uses eye-tracking technology which quickly delivers precise, objective eye movement recordings by surveying the eye

several times per second. Oculomotor assessments produce quantifiable data to complement existing TBI screening methods. Oculomotor function is broken down into movement categories including smooth pursuits, saccades, and fixations. Smooth pursuits occur when the eyes track a moving stimulus to stabilize the image. Saccades are rapid movements between fixation points. Fixations keep the eye position in a relatively still state to hold the image of a stationary target. The different eye movements are activated by different regions of the brain. For example, fixations involve specific cerebral and brainstem structures.

Below and attached is a sample report of an oculomotor evaluation of a patient with a severe TBI. You will notice the disorganized and erratic oculomotor function during smooth pursuit and saccades, as well as very poor fixation stability. You can also see in the reference diagrams the areas of the brain that are involved in the different evaluations. This sample test represents objective information supportive of a brain injury which is quite serious. This information can be used in conjunction with neurocognitive assessments to provide a strong foundation for the diagnosis of a mTBI and does so relatively inexpensively. With this information, the doctor can decide if more testing is warranted or if the testing by itself as well as the findings during their consultations and treatment are sufficient to support the diagnosis of mTBI.

Below the diagram is a list of references you may want to review. As always, I am available to address any questions.

## Supportive Literature

- [Head Position and Posturography: A Novel Biomarker to Identify Concussion Sufferers](#) - December 2020
- [Oculomotor Training for Poor Saccades Improves Functional Vision Scores and Neurobehavioral Symptoms](#) - November 2020
- [Oculomotor Behavior as a Biomarker for Differentiating Pediatric Patients With Mild Traumatic Brain Injury and Age Matched Controls](#) - November 2020
- [Oculomotor Training for Poor Pursuits Improves Functional Vision Scores and Neurobehavioral Symptoms](#) - April 2020
- [Vertical Smooth Pursuit as a Diagnostic Marker of TBI](#) - January 2020
- [Oculomotor Behavior of Acutely Concussed Patients undergoing Hyperbaric Oxygen Treatment & Posters](#) - September 2019
- [Horizontal and vertical self-paced saccades as a diagnostic marker of traumatic brain injury](#) - July 2019



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A MEDICAL-LEGAL NEWSLETTER FOR PERSONAL INJURY ATTORNEYS BY DR. STEVEN W. SHAW

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- [An Examination of the Oculomotor Behavior Metrics within a Suite of Digitized Eye Tracking Tests](#) - February 2019
- [Dynamic Vision Trainer Validation Study Summary](#) - November 2018
- [Reliability of Computerized Eye-tracking Reaction Time Tests in Non-athletes, Athletes, and Individuals with Traumatic Brain Injury](#) - July 2018
- [Lingering Binocular Vision Issues after a Suspected Concussion: A Case Study](#) - June 2017
- [WEBSITE - All RightEye Published Research](#)

Name: - Severe TBI  
 Date of Birth:  
 Assessment Date: 2/25/2020 8:12 PM

