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**Efficacy of a novel eye tracking system to evaluate mild traumatic brain injury in pediatric patients****Brian Still**

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Prior research established a strong correlation between mild traumatic brain injury (mTBI) and impaired eye movement, specifically smooth pursuit eye movement (Master et al. 2018; Maruta et al. 2010). It was previously known that strength of visual attention is associated with the same areas of the brain that are damaged in concussion. Master's research shows the efficacy of eye tracking, in particular, in monitoring eye tracking to understand mild traumatic brain injury in pediatric populations. Maruta's research shows that predictive timing, an essential element of attention, is very often impaired in individuals with mTBI. Prolonged concussion recovery in 88% of a study group (n=432) was detected through eye tracking testing in the Master's et al study. Predictive timing, termed dynamic visuomotor synchronization (DVS) by Maruta, involves constant sensory processing and motor execution of goal-oriented behavior. In 13 concussed and 127 normal subjects between the ages of 18 to 55, DVS scores of subjects with mild head injury were worse than 95% of those without concussion. Also, longitudinal monitoring of injured subjects revealed that their DVS scores improved toward the normal range as they healed. The scores were reproducible with little learning effect. Building on Maruta's discovery and DVS concept, and receiving supporting evidence from Master's recent study, EyeGuide created Focus, a 10-second eye tracking tool intended for detecting brain injury in youth sports athletes quickly, accurately, and reliably. The Focus eye tracking hardware resembles a standard ophthalmological chin rest; the software, which displays the test stimulus, runs on an iPad. Together, the hardware and software convert 10 seconds of the patient's smooth pursuit eye movement into a numeric score. This score represents dynamic visual synchronization (DVS) error or deviation from the expected movement. Patients first receive a baseline test score. Then, later, the system compares additional patient test scores with the baseline score to measure impairment. This abstract reports on the results of 10,000+ eye tracking tests, using EyeGuide Focus, in a pediatric (age 13-22) population, as a means of understanding the efficacy of a particular eye tracking technology to analyze visual eye movements to understand neurological impairment after injury.

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