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Using a brain electrical activity biomarker could aid in the objective identification of mild Traumatic Brain Injury patients

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The overall number of Emergency Departments (ED) visits from 2006 to 2010 reportedly increased by 3.6%, during which time visits for traumatic brain injury (TBI) increased by 29.1% [1]. This sharp increase reflects heightened awareness about TBI, which is expected to drive this number even higher in the future [1]. Further, 95% of all head-injured patients who visit the ED present with mild symptoms [2].

Currently, Computerized Tomography (CT) is the accepted gold standard for identifying acute intracranial injuries in the ED. Although the vast majority of head injured patients receive a CT scan, over 90% are found to be CT negative [3, 4]. Standard clinical practice in the ED does not include assessment of functional brain injury or concussion in patients found to be CT-. Early identification of mild TBI/concussion is associated with lower risk of re-injury, reduced morbidity and improved outcomes [5]. The identification of mTBI/concussed patients and their ED discharge referrals could be greatly aided by accurate, objective, quantitative information about brain function status [6].

In a multi-site prospective clinical validation trial, the Brain Function Index (BFI), an EEG-only, objective assessment of the brain function abnormalities resulting from mTBI/concussion, was shown to scale with severity of functional impairment [7, 8]. The BFI was derived from EEG features reflective of the current consensus of concussive physiology, (e.g., disruption in “connectivity” related to integrity of fiber tracts), and is scaled as a percentile of a non-head-injured population.

This trial was conducted in 11 US EDs and included 720 patients with GCS 12-15, evaluated within 72 hours of sustaining a head injury, with informed consent obtained in all cases[7]. 5-10 minutes of EEG data was acquired from frontal and frontotemporal locations using the handheld BrainScope One device. The present retrospective analysis focuses on the cohort of this population in the 18-40 age range who were found to be CT-, which is of major relevance to both sports-related concussions and military-related head injuries. There were 296 subjects in this subgroup (54.7% males), with a mean age of 26.6 (sd=6.1), mean GCS = 14.98 (98% with GCS

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