A Novel Acute Detection Method for Mild Traumatic Brain Injury

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Traumatic brain injuries (TBIs) are a widespread and underreported incident throughout civilian and Defense sectors, occurring often in military conflicts and sports accidents among other activities. With the need for more accurate diagnostic and treatment options, efforts to deduce the pathophysiological cascade from injury to recovery have had mixed results, the largest barrier being limited evaluative techniques or technologies at or near the initial insult. This study aimed to develop a force-threshold activated, portable helmet electroencephalogram (EEG) and to perform a mini literature review, capturing the current understanding of the TBI pathophysiology cascade until recovery. The goal was to have a better grasp of the effects of TBI generation on the human body until recovery and to identify device integration points in current care pathways. The review showed suspected measurable events from high concentrations of ion and neurotransmitter release within minutes of primary insult, further suspected to generate epileptiform EEG wave activity. A second device iteration increased electrode channels from eight to sixteen, approaching clinically relevant amounts of measurement, while adding data retrieval options for anticipated future use with clinical software. The review highlighted the need for a reliable diagnostic adjunct at point of injury to meet the needs of both clinical and research interests, a need our device has the potential to meet.