

## **BRAINWAVE SIGNATURES FOR DETECTING MALINGERED NEUROCOGNITIVE DEFICIT (MNCD)**

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Traumatic brain injury is a major public health concern in the United States, affecting up to 1.7 million people each year. Mild traumatic brain injury (mTBI) accounts for 80% of these cases. Various tests have been created in order to document brain injury and evaluate cognitive functions. However, neuropsychologists report that up to 40% of individuals undergoing evaluations following mTBI may be malingering deficits. This points to a need for innovative and non-invasive approaches to validating mTBI while identifying malingerers.

The aim of this study was to utilize neuroimaging and behavioral approaches to detect MNCD by comparing the reaction times and brainwave signatures of honest and malingerer cohorts during a working memory test. Subjects were grouped into three cohorts: healthy controls with no history of head injury (n=16), otherwise healthy subjects malingering cognitive deficits (n=16), and those with documented mTBI (n=15). Subjects were fitted with a 32-channel electrode EEG cap and asked to perform two tasks: a computerized version of the Test of Memory Malingering (TOMM-C) and an old-new memory recognition task. Data were recorded using Neuroscan 4.5 and analyzed using EP Toolkit 2.0.

Event-Related Potentials (ERPs), which are time locked to an event or a stimulus have also been used to detect malingering. In this study, P300 was used as indicator for recognition memory because it is an ERP component elicited in the process of decision making.

Preliminary results indicate latency differences in the onset of the P300 wave (associated with attention, memory, and executive function) in the frontal cortex, which could be related to additional neural processes associated with malingering. Additional differences in mean voltage between the P300 waveforms of the honest and malingering groups were identified in the central and occipital lobes as well. Reaction time will be studied to further correlate differences between the three groups.

*Keywords:* traumatic brain injury, electroencephalogram, event-related potentials, reaction time, honest, malingers