

Density (PSD) and Amplitude Envelope Correlation (AEC) were computed across five frequency bands (delta, theta, alpha, beta, gamma). We performed Wilcoxon tests to compare PSD and AEC between Condition (pre-LCM, post-LCM, HC) for each frequency band. Finally, we employed logistic regression to assess the performance of qEEG in predicting clinical outcome.

Results: No significant qEEG changes were observed between pre- and post-LCM. Theta-band PSD and connectivity were higher in PwE than HC, both pre LCM (connectivity, $p=0.038$; PSD, $p=0.04$) and post LCM (connectivity, $p=0.007$; PSD, $p=0.005$). AEC connectivity in the theta band predicted clinical outcome (2-years seizure freedom) with an estimated accuracy of 60% (area under the curve [AUC]=0.66) for the EEG pre-LCM and 75% (AUC=0.86) for the EEG post-LCM.

Conclusion: These findings support the use of pharmacoelectroencephalography as a non-invasive tool for predicting long-term clinical outcomes in focal epilepsy.

1934 | Electroencephalographic Changes in Patients with Blast-Induced Concussion

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Purpose: Blast-induced concussion is classified as a mild traumatic brain injury (mTBI). It may elevated risk of developing epileptic seizures. The aim is to investigate electroencephalography (EEG) changes in patients in the chronic stage of blast-associated mTBI and to assess the potential of using EEG data for objective confirmation of brain injury.

Method: The study included 32 male combatants aged 25–43 years with a diagnosis of “mTBI, chronic stage” (6 months to 3 years post-injury), and a control group of 15 healthy males. EEG was recorded in a soundproof room using a 19-channel NeuroCom EEG system (Ukraine) with a sampling rate of 400 Hz and 16-bit resolution. Electrodes were applied according to the international 10–20 system. EEG recordings were conducted during resting wakefulness for up to 30 minutes, including activation procedures: eye opening/closing, intermittent photic stimulation, and 3 minutes of hyperventilation. Both visual and spectral EEG analyses were performed. Spectral analysis was conducted on artifact-free, stationary segments (35–45 seconds) of resting-state EEG. Spectral analysis was conducted on artifact-free, stationary segments (35–45 seconds) of resting-state EEG.

Results: Compared to controls, the mTBI group demonstrated decreased relative power in the alpha band and

increased power in the beta, theta, and delta bands, predominantly in frontal and temporal regions. Visual analysis revealed frontal intermittent rhythmic delta activity (FIRDA) in 37.5% of cases, mild background slowing on the side of trauma in 87.5%, anterior temporal and frontal spikes in 21.9%, occipital spikes in 15.6%, and generalized spike-wave discharges in 6.3%.

Conclusion: The EEG alterations identified in patients with chronic blast-induced mTBI suggest a general decrease in cortical functional activity. The presence of intermittent slow-wave activity in frontotemporal regions may reflect disruption in prefrontal-subcortical connectivity due to microscopic white matter damage. These findings may represent early electrophysiological markers of increased neuronal excitability and epileptogenesis.

1969 | Detection of Interictal Spikes with Simultaneous EEG and OPM-MEG

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Purpose: Optically-Pumped Magnetometer Magnetoencephalography (OPM-MEG) is an emerging functional neuroimaging tool which measures the magnetic fields induced by current flow in cortical neurons. It's primary benefit over traditional MEG is its wearability, allowing sensor placement close to the scalp regardless of head size and enabling free head movement during recordings. In recent years it has been used to detect interictal spikes in pediatric epilepsy patients. However, many challenges remain including clinical interpretation of OPM-MEG which depends on the orientation and number of sensors, sensor bandwidth, and the presence of cable and magnetic field artefacts. Electroencephalography (EEG) is the standard technique for recording interictal activity and is interpretable by clinicians worldwide. By simultaneously recording EEG and OPM-MEG in a cohort of pediatric epilepsy patients, we aim to enable interpretation of interictal OPM-MEG data, bridging the gap between OPM-MEGs potential and its concrete clinical utility.

Method: Nine pediatric epilepsy patients (age 5.6–13.5 years) were recruited. Four had known focal, one known multifocal, and four known generalized epileptiform discharges (recorded in previous clinical EEGs).