

Developing Novel Metrics for Assessing Traumatic Brain Injury Severity Using a Patch-Type Electroencephalograph and an Automated Pupillometer

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In this study, as a novel approach to assessing the severity of patients with traumatic brain injury, we analyzed the correlation between intracranial pressure (ICP) and quantitative physiological data obtained using a patch-type electroencephalograph (EEG) and an automated pupillometer. The patch-type EEG captured frontal EEG signals, and analyzing the power spectrum across different frequency bands enabled the visualization of distinct EEG trends between mild and severe cases. By utilizing the EEG spectral data and quantitative metrics from the automated pupillometer as explanatory variables, we were able to predict elevated ICP states—as detected by an invasive ICP sensor—with an AUROC of 0.67. These findings suggest that applying simple, quantitative, and non-invasive devices, such as the patch-type EEG and automated pupillometer, could potentially serve as an alternative for obtaining information that traditionally requires highly invasive ICP monitoring. Moving forward, it is necessary to accumulate more cases and proceed with establishing robust validation.