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F212. Desynchronized Lower Alpha Rhythms Were Associated With Functional Ischemia in the Prefrontal Cortex in Heroin Patients After Protracted Abstinence: A Concurrent EEG-fNIRS Study

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PlumX Metrics

Background

Chronic and recurrent opiate insult injuries brain tissue and can cause serious pathophysiological changes in hemodynamic and its subsequent inflammatory responses. Prefrontal cortex is a primary target for drug addiction, in large part, because of its well-known executive functions.

its strong connection with limbic reward regions. However, the mechanism underlying the systems-level neuroadaptations during abstinence has not been fully characterized across drug classes. The objectives of our study were to determine which neural oscillatory activity contributed to the chronic effect of opiate exposure on abstinence and whether the activity could be coupled with neurovascular information in the PFC.

Methods

We employed resting-state functional connectivity to explore alterations in 8 heroin-dependent patients who stayed abstinence (>3 months) (HD) compared with 11 control subjects. A bimodal non-invasive neuroimaging strategy was applied to combine electrophysiological signals indicative of neural synchrony and the oscillatory activity through electroencephalography (EEG) with hemodynamic signals indicative of cerebral blood oxygenation in small vessels in the PFC through function near-infrared spectroscopy (fNIRS). Machine learning was used to obtain associations between EEG and fNIRS modalities to improve precision and localization.

Results

HD patients show desynchronized lower alpha rhythms through EEG measurement and decreased rsFC and connectivity strength through fNIRS measurement in PFC network. Moreover, asymmetric interhemispheric excitability evidenced by hemodynamic patterns in PFC was observed, suggesting that the cerebrovascular abnormality in this region may be a marker for heroin protracted abstinence.

Conclusions

Asymmetric excitability in PFC and cerebrovascular injury were found in heroin addiction after protracted withdrawal through electrovascular neuroimaging.

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