

Functional connectivity changes in absence epilepsy studied by resting-state functional magnetic resonance imaging

Fang Tie

Xuanwu Hospital affiliated to Capital Medical University, Department of Functional Neurosurgery, Beijing China

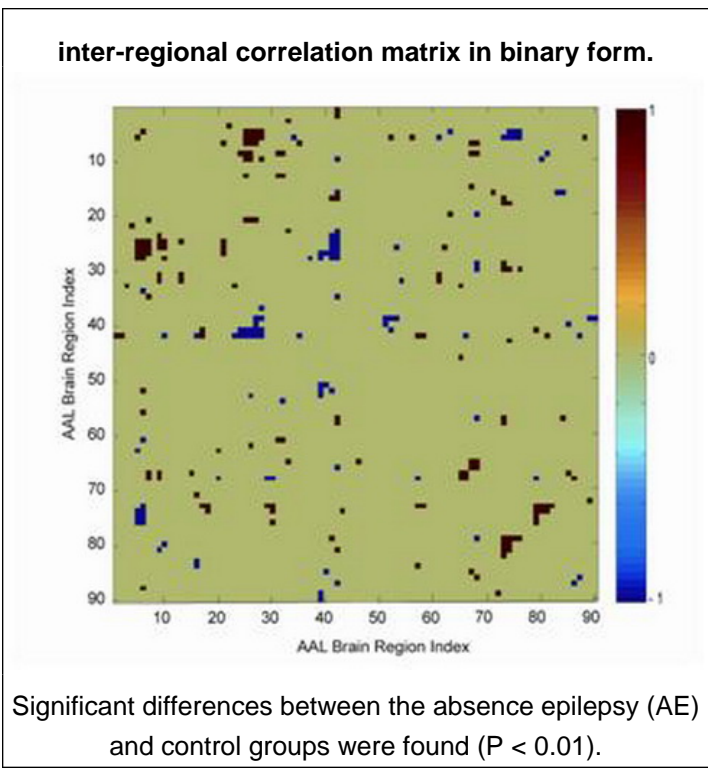


Introduction

Functional connectivity has been correlated with a patient's level of consciousness and has been found to be altered in several mental disorders. Absence epilepsy patients, who experience a loss of consciousness, are assumed to suffer from alterations in thalamo-cortical networks; however, previous studies have not explored the functional connectivity between different brain modules in this mental disorder

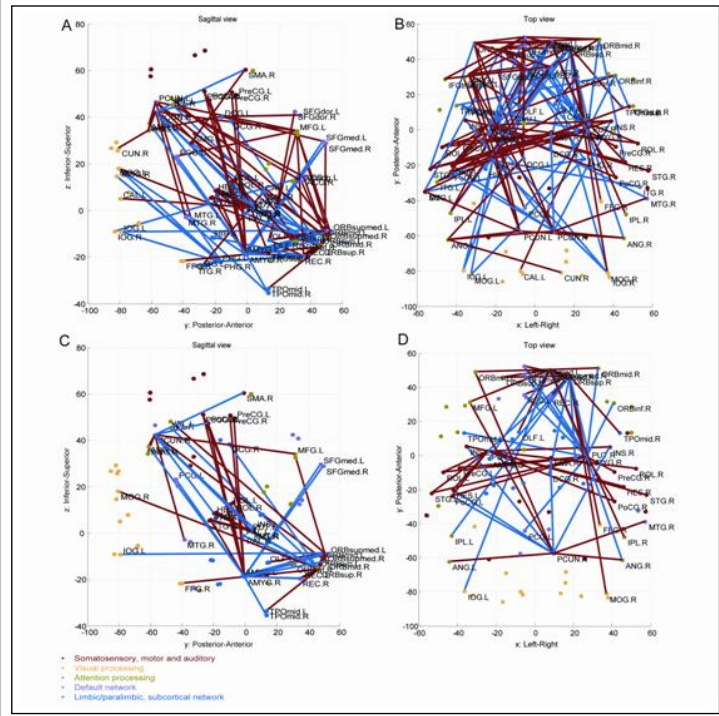
Methods

We used resting-state functional magnetic resonance imaging to examine the alteration in functional connectivity that occurs in absence epilepsy patients by parcellating the brain into 90 brain regions/nodes, as was performed in previous small-world network studies(fig1).



Results

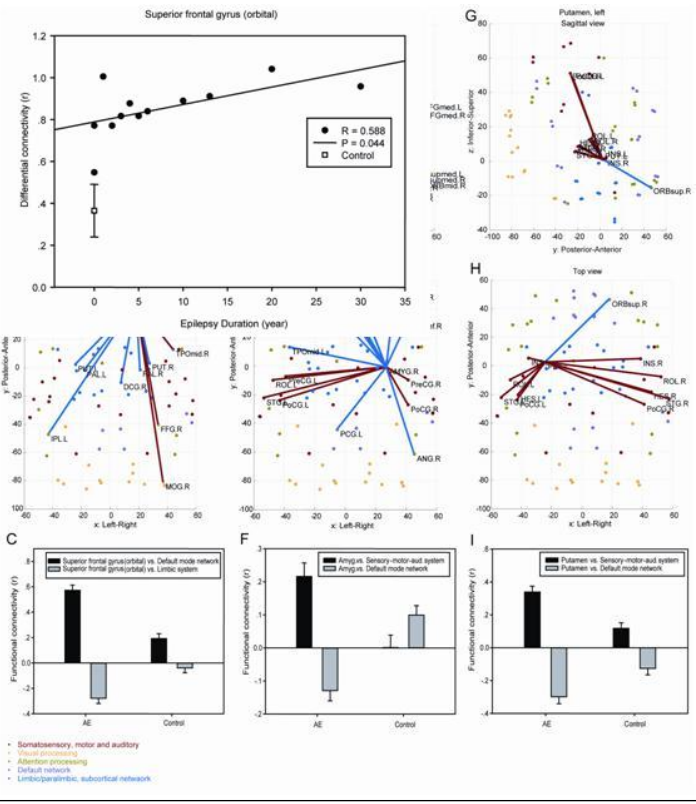
Some brain regions had a greater number of altered connections and therefore behaved as key nodes in the changed network pattern; these regions included the superior frontal gyrus, the amygdala and the putamen. The within/between modules functional connectivity in absence epilepsy patients showed a tendency of divergence from the pattern in control subjects that included an increase in the value of positive connections and a decrease in the value of the negative connections(fig2).



Conclusions

In particular, the superior frontal gyrus demonstrated both an increased value of connections with other nodes of the frontal default mode network and a decreased value of connections with the limbic system. This divergence is positively correlated with epilepsy duration(fig3).

The pattern of within/between module divergence for individual nodes.



Learning Objectives

By the conclusion of this session, participants should be able to understand that an altered functional connectivity within and between functional modules in the absence epilepsy patients. This research may help us to understand the neural mechanisms of consciousness in general, further investigations will be required to identify the specific mechanisms in future studies.