Impaired Resting State Networks in Temporal Lobe Epilepsy: A Resting State fMRI Study

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Temporal lobe epilepsy (TLE) is the most common type of human refractory epilepsy and can cause widespread impairments in brain functionality. Previous studies show functional and structural abnormalities in different regions of TLE patients' brain in comparison with normal subjects. However, limited studies have been done on connectivity abnormalities of resting state networks (RSN) in TLE patients and most of them studied default mode network (DMN) only. In this paper, nine independent spatial maps of the brain were identified by applying independent component analysis (ICA) on functional magnetic resonance images (fMRI) of the subjects. These maps were classified into four resting state networks: visual network, auditory network, default mode network, and attention network (including right and left fronto-parietal networks and core network). Functional connectivity between time courses of the nine components were computed and then compared between TLE patients and healthy subjects. Results show that there are significant between-group differences in functional connectivity among different brain networks including decrease in functional connections of visual cortex with two other networks, DMN and attention network, and decrease in functional connectivity between DMN and left fronto-parietal network. An increase in functional connectivity between DMN and core network and also between right fronto-parietal network and auditory network is observed.