Altered connectivity in focal epilepsy

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According to the recent studies, epileptic brains have specific alterations in connectivity and network topology both in functional and structural networks, which have led to the recent hypothesis that epilepsy is a brain network disease rather than a focal disease. To characterize the functional brain networks in epilepsy from an electrophysiological perspective, we investigated resting-state functional networks identified by using magnetoencephalography (MEG) signals in epilepsy patients with focal cortical dysplasia (FCD) and mesial temporal lobe epilepsy (mTLE) with hippocampal sclerosis (HS). By virtue of the high temporal resolution of MEG, we investigated the various frequency bands such as theta, alpha, beta, and gamma frequency bands. At the sensor level study of FCD, we found that FCD brains had increased functional connectivity in the beta and gamma frequency bands at the resting state compared with those in healthy controls. Interestingly, patients exhibited different network characteristics depending on the type of FCD. At the source level study of FCD, we found that FCD alters whole brain functional cortical hubs compared to healthy controls in various frequency bands, which are indicative of network reorganization of brain networks. At the source level study of mTLE with HS, we found altered electrophysiological functional hubs in mTLE patients. Since we detected network hubs in both hippocampal and extra-hippocampal areas, it is probable that mTLE is a large-scale network disorder rather than a focal disorder. In conclusion, resting-state brain network studies in epilepsy might helpful enhancing our understanding of the epileptic brain as a network disease.

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Neurological outcome after resection of primary somatosensory cortex

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Object: The postoperative neurological outcome has not been well documented after resection of the primary sensory cortex (S1). This study was designed to evaluate the neurological deterioration that follows resection of the S1 and to assess the risk factors associated with these morbidities.

Methods: We reviewed 50 consecutive patients who suffered from pharmacologically intractable epilepsy and underwent the resection of the S1 and/or adjacent cortex with intraoperative cortical stimulation and mapping while under awake anesthesia. The 50 patients were categorized into 4 groups according to the resected area on the postoperative magnetic resonance images: Group 1 (resection of the only S1; $n=6$), 2 (resection of the only posterior parietal cortex (PPC); $n=28$), 3 (resection of both S1 and PPC; $n=6$), and 4 (resection of both S1 and precentral gyrus; $n=10$).

Results: After the resection of S1 and/or adjacent cortex, 16 patients (34%) experienced neurological worsening, including 5 permanent deficits (10%) and 11 transient deficits (22%). Permanent deficits included 2 motor dysphasia, 1 dysesthesia, 1 gait disturbance, and 1 fine movement disturbance of hand. The neurological risks were 17% (1/6) in the group 1, 21% (6/28) in the group 2, 50% (3/6) in the group 3, and 60% (6/10) in the group 4. The permanent neurological deficits showed in 0 patients (0%) of the group 1, 1 (4%) of the group 2, 1 (17%) of the group 3, and 3 (30%) of the group 4.

Conclusions: The neurological results of the S1 resection were tolerable, however, the resection of the PPC or the primary motor cortex in addition to S1 was significantly associated with the development of postoperative neurological impairments.

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