Abstract

Although most functional and structural neuroimaging studies have reported that cognitive deficits in patients with schizophrenia are associated with the pathophysiology of the prefrontal cortex, their findings were remarkably various. The aim of this study is to simultaneously investigate evidence of the functional and structural abnormalities of the prefrontal cortex in patients with schizophrenia.

The subjects consisted of twelve patients with schizophrenia and 12 age- and sex-matched normal volunteers. Magnetic resonance images were obtained in all subjects, and parceled into 8 frontal substructures using the topographic landmarks. $[^{15}\text{O}]\text{H}_2\text{O}$ PET was scanned during the visual working memory task and the control task, and the activities of the...
parceled frontal substructures were examined on the registered PET images.

In the comparison of subregional volumes, most frontal substructures of the patient group tended to be smaller than those of the normal comparison group; particularly, the right supplementary motor area was significantly smaller (p<0.003). Negative symptoms in the patient group tended to be inversely correlated with the frontal subregional volumes, particularly with the right superior frontal gyral volume (γ=-0.704, p=0.01). In the comparison of the subregional functional activation pattern, the normal comparison group showed the tendency of activation of the right rostral anterior cingulate during performing working memory, whereas the patient group did not show such tendency. Instead, the patient group showed the reduced activation of the right orbitofrontal cortex that was not functionally reduced in the
normal comparison group.

To my knowledge, this is the first study that applies the same regions of interest to the structural and functional abnormalities in schizophrenia. The results suggest that functional changes in schizophrenia may result from activating the abnormal neural system for performing cognitive functions. These functional changes do not accompany the definite structural changes, and were not secondary to the structural changes.

Key Words : Schizophrenia, Frontal Substructures, MRI, PET, Working Memory

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