

Purpose: The prefrontal cortex (PFC) and parietal cortex are important in performing working memory (WM) tasks. In this study we performed fMRI studies to compare the activation regions between the schizophrenic patients and controls using the 2-back WM task paradigm. In addition, the gray matter (GM) loss between these two groups was compared using the voxel based morphometry (VBM) analysis. The brain regions showing differences in fMRI and VBM studies were compared to investigate the consequence of structural atrophy on functional activation.

Method and Materials: This study included 14 schizophrenic patients (M/F: 8/6) and 10 normal controls (M/F: 8/2). The fMRI employed a gradient-echo echo planar imaging (EPI) sequence to detect blood oxygenation level dependent (BOLD) signal changes associated with neural activities. After the functional session, high-resolution 3D anatomical images were acquired for VBM analysis, using a 3D-FLASH sequence (TE/TR=4/9.7 msec, FA=12, slice thickness = 1.25 mm, 256 x 192 in-plane matrix). The voxels with the highest z-values represented the region where GM volume was significantly different between these two groups.

Results: The regions showing increased activity in controls included the right superior frontal gyrus (BA8), middle frontal gyrus (left BA6 and right BA8), left precuneus (BA7), left fusiform (BA37), anterior bilateral insula, and left putamen. On the other hand, the patient group showed increased activities in the right inferior frontal gyrus in the lateral PFC (BA10/46) and right parietal lobule (BA40). **Conclusions:** A more liberal threshold condition of $p < 0.001$ was applied to examine any threshold-dependence of laterality in activities in PFC, but the activity was still observed solely on the right PFC. The VBM result show reductions in GM in Schizophrenia versus controls in the anterior cingulate (BA 24.31), medial frontal (BA 10), superior temporal, middle temporal and fusiform gyrus (BA20).