

Short-term Follow up Study of Grey Matter Volume Changes in Antipsychotic-naïve First Episode Schizophrenia: an Optimized VBM study

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Introduction

Past morphometric studies reported several cerebral deficits in patients with schizophrenia[1,2], and the reductions in brain volumes were recognized as one of the most important image makers. Our earlier study reported that right superior temporal gyrus, middle temporal gyrus and left anterior cingulate gyrus volume decreased in antipsychotic-naïve first episode schizophrenia (FES) patients[3]. However, it remains unclear whether these structural deficits persists or deteriorates after treatment. The present study aimed to clarify the brain structure changes after short-term treatment in antipsychotic-naïve first episode schizophrenia (FES) patients using optimized voxel based morphometry (VBM).

Method

The study was approved by the local ethical committee and written informed consent was obtained from all subjects. 37 first-episode treatment naïve schizophrenia patients with follow-up MR scan were selected among 68 recruited patients in our study. The diagnosis is based on DSM-IV, and the severity was evaluated by Positive and Negative Syndrome Scale (PANSS). 22 age and sex matched normal controls with follow-up exam were included also. All subjects were right-handed. High-resolution T1-weighted images were acquired for all participants using 3.0T GE EXCITE system (156 continual axial slices, TR/TE: 8.5/3.4msec, Flip angle: 12°, Matrix: 256×256, slice thickness 1mm, voxel size: 0.47×0.47×1.00 mm³) at baseline and 6 weeks after antipsychotic treatment. All images were then transferred to workstation for subsequent VBM analysis. Data processing was performed using Matlab 7.0 (MathWorks, Natick, Massachusetts, USA) and SPM2 (<http://www.fil.ion.ucl.ac.uk/spm/software/>). Optimized VBM analysis included the creation of a study-specific whole brain template and the following data segmentation, registration to and re-segmentation in standard space. Voxel-by-voxel based comparisons of gray matter volume (GMV) were then performed between groups using two sample t-tests.

Results

Compared with normal controls, the patient group showed decreased gray matter volume mainly in right superior temporal gyrus, right middle temporal gyrus, cuneate lobe of right occipital lobe as well as left postcentral gyrus at baseline(without treatment). The follow-up scan performed 6 weeks later showed increased gray matter volume in left inferior frontal gyrus and right putamen, hippocampus, amygdala in patient group when compared to baseline exams ($p < 0.05$). There was no statistically significant correction between the volume increase and decrease of PANSS score ($p > 0.05$).

Discussion

Decreased brain structure volumes have been reported as one of the common findings in many schizophrenia studies, some of them with follow up measurements. Most follow up studies showed the progressive brain volume loss [4,5]. However, the follow up imaging exams they did were mainly at end of 1 year or 1 year later. In our study, we did the follow up exam after 6 week antipsychotic treatment. The results showed, contrary to most other follow up studies, the increase volume of some brain structures such as left inferior frontal gyrus and right putamen, hippocampus, amygdala. This finding demonstrated that brain volume of schizophrenia patients changes differently in different time periods. It is likely that these patients were responsive to treatment when they were examined in short-term follow up. But how long the period will last and how brain volume change over time remains to be answered in future studies. Serial studies are necessary to gain further insight into our current findings.

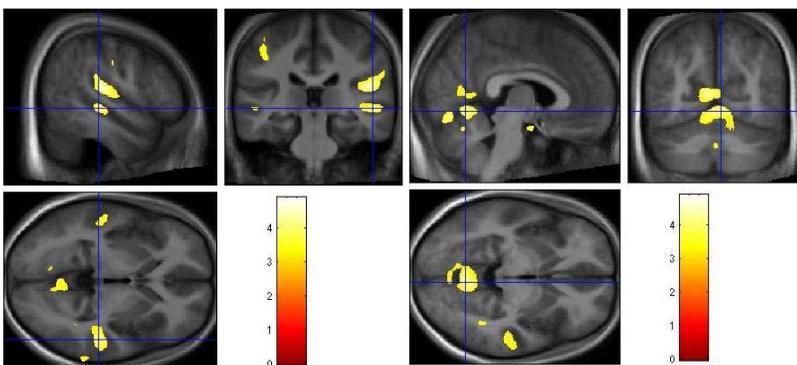


Figure 1. Showing the baseline grey matter volume decreased regions of right superior temporal gyrus, right middle temporal gyrus, cuneate lobe of right occipital lobe and left postcentral gyrus when compared to controls ($p < 0.05$).

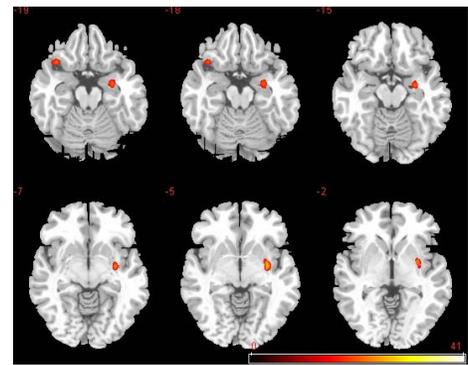


Figure 2: Red areas showing the regions of increased gray matter volume, mainly are left inferior frontal gyrus and right putamen, hippocampus, amygdala in patient group after 6 week antipsychotic treatment when compared to baseline exam ($p < 0.05$).

References

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