Amplitude of low frequency fluctuation in treatment naive schizophrenia revealed by resting-state functional MRI

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Introduction

The hypofrontality in schizophrenics has been found with PET and fMRI (1,2) in resting-state condition. Using a new resting-state fMRI index, amplitude of low frequency fluctuation (ALFF) (3), the aim of the current study was to test the hypofrontality in drug naïve schizophrenics as compared with controls.

Material and Method

The study was approved by the local ethical committee and written informed consent was obtained from all subjects. Twenty drug naïve schizophrenics were included based on DSM-IV criteria but 3 patients were excluded due to excessive head motion (> 3 mm). The remaining 17 patients (aged 24.2 ± 9.4 years, range 17-49 years, 8males) were compared with 17 gender-, age- and education-matched controls (aged 24.5± 9.6 years, range 16-49 years, 8 males). All subjects are right handed. Resting-state fMRI data were acquired using a 3T MR imaging system (EXCITE, General Electric, Milwaukee, USA) with an 8 channel phase array head coil (TR/TE 2000/30 ms, flip angle 90 °, matrix 64 × 64, FOV 24 cm, thickness/gap 5/0mm, total 200 volumes, 30 axial slices). Data preprocessing included sclice timing, head-motion correction, spatial normalization by using SPM. Further analyses were performed in AFNI, including band-pass filtered (0.01 - 0.08Hz), linear-trend removing, power spectrum calculation [3], mean square root (0.01 – 0.08 Hz), spatial smoothing (FWHM =6 mm), and normalization by dividing global mean ALFF. Two sample t-test was used to compare the ALFF differences between the two groups.

Results

Significant decreased ALFF (voxel $p < 0.01$, $|T| > 2.742$, cluster size > 864 mm^3, corresponding corrected $p < 0.05$) was found in bilateral orbitofrontal gyrus (Brodmann area 11) and in left middle frontal gyrus (Brodmann area 10) in drug naive schizophrenics compared with controls (Fig. 1).

Discussion & Conclusion

The results of decreased ALFF in the prefrontal areas of drug naïve schizophrenics are consistent with the hypothesis of hypofrontality in schizophrenia. The decreased ALFF may reflect decreased spontaneous neuronal activity and provide further understanding of the neurophathology of schizophrenia.

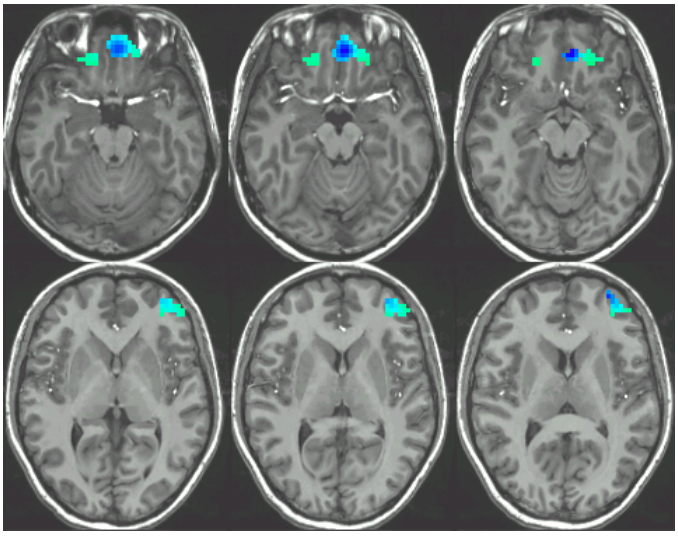

Fig. 1. Decreased ALFF in the bilateral orbitofrontal gyrus (Brodmann area 11, Upper) and left middle frontal gyrus (Brodmann area 10, Lower) in drug naïve schizophrenics compared with controls.

Reference

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