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Schizophrenia Research 64 (2003) 35–39
SCHIZOPHRENIA RESEARCH
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A MRI study of fusiform gyrus in schizotypal personality disorder

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Received 8 August 2002; received in revised form 2 December 2002; accepted 12 December 2002

Abstract

The fusiform gyrus is important for face and object recognition, is abnormal in schizophrenia, but has not been studied in schizotypal personality disorder (SPD). Thin-slice MR images showed no differences, either in right, left or total fusiform gyri volumes, between subjects with SPD ($N=21$) and normal controls ($N=19$). However, there was a correlation between severity of illusions and magical thinking suffered by the SPD subjects and smaller right fusiform gyrus volumes. This suggests that future studies may be useful in determining the functional competence of this gyrus in SPD.

Keywords: Schizophrenia; Schizotypal personality disorder; Fusiform gyrus; Magical ideation; Illusions; MRI

1. Introduction

The fusiform gyrus is likely important for face and object visual processing, as demonstrated by functional magnetic resonance imaging (fMRI) (Kanwisher et al., 1997). In addition, direct electrical stimulation of the gyrus can result in the formation of complex visual illusions (Lee et al., 2000). In schizophrenia, studies show that the fusiform gyrus evinces bilateral volume reductions in both a postmortem study (McDonald et al., 2000) and in an in vivo structural MRI study (Lee et al., 2002).

Schizotypal personality disorder (SPD) shares with schizophrenia: (1) a similar genetic diathesis (Kendler et al., 1993); (2) many biologic markers (Siever et al., 2002; Siever, 1994); (3) MRI in vivo volume reductions in left temporal lobe structures (Dickey et al., 1999; Downhill et al., 2001); and (4) impaired recog-

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doi:10.1016/S0920-9964(02)00529-7

nition of facial emotions (Mikhailova et al., 1996). By definition, persons with SPD can be functionally impaired by experiencing illusions. This study was undertaken to determine whether, like schizophrenics, SPD subjects also have smaller fusiform gyrus volumes than control subjects which might help to explain the experience of illusions.

2. Methods

2.1. Subject recruitment

Subjects were recruited from the local community with the following inclusion criteria: right-handed males 18–55 years old with English as the first language; no lifetime history of neurologic disorder or ECT; no exposure to neuroleptics; no psychoactive medication usage; and no substance abuse within the last year or dependence within the last 5 years. Comparison subjects met the additional criteria of no history of Axis I disorder in self or first-degree relatives. In accordance with our local IRB committee, written informed consent was obtained from all subjects after the procedures were explained, and prior to study participation. All subjects underwent a SCID and SCID II (personality disorders) interview to determine diagnosis. For SPD subjects, responses to the SCID II section on SPD symptoms were used as scaled measures for the degree of impairment for each of the nine SPD criteria. They were group matched on age (individually matched within 3 years), parental socioeconomic status (SES), years of education, and premorbid IQ assessed by WRAT score (data available for 20 SPD, 11 control subjects). Subject overlap with two previous publications include 9/14 SPD and 11/16 comparison subjects, where previously we reported reduced left superior temporal gyrus volume and trend level reduced cortical gray matter in SPD (Dickey et al., 1999, 2000). Additionally, in another publication, the subject overlap was16/21 SPD and 12/22 comparison subjects, where we reported smaller left Heschl's gyrus volume in SPD (Dickey et al., 2000).

2.2. MRI procedures

Images were acquired on a 1.5-T MRI system (GE Medical Systems, Milwaukee, WI) with the same acquisition and preprocessing procedures as previously described (Dickey et al., 1999). Briefly, 1.5-mm-thick images were acquired in the coronal plane. Images were realigned to correct for head tilt and reformatted into thin 0.9375-mm slices with isotropic voxels on which the fusiform gyrus was manually drawn (Figs. 1 and 2). The anterior boundary was one slice posterior to the complete mammillary body, and the posterior extent was the juncture of the calcarine fissure and the parieto-occipital sulcus as seen on sagittal slices previously described (Lee et al., 2002). The medial boundary was the collateral sulcus which separates the fusiform gyrus from the parahippocampus, and the lateral boundary was the sulcus separating the fusiform and inferior temporal gyri (McDonald et al., 2000).

2.3. Statistical procedures

On clinical measures, a Students' *t*-test was performed to compare groups. To correct for effects of head size, a linear regression procedure was performed on the left and right fusiform volumes with intracranial contents (parenchyma and CSF) as the independent variable. Saved residuals were used in subsequent analyses. All corrected data were normally distributed as per the Shapiro–Wilk test. A repeated measures ANOVA was performed with the between subject factor of diagnosis and within subject factor of hemisphere. One-way ANOVA was performed on total

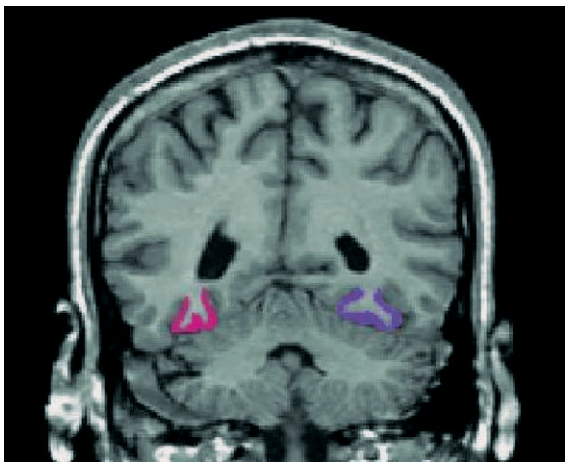

Fig. 1. Manual tracing of right (pink) and left (purple) fusiform gyrus on a coronal image of SPD subject.