Combined fMRI and LORETA study of illusory contour perception in schizophrenia

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Abstract

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Abstract

Schizophrenic patients and healthy controls participated in functional MRI (fMRI) experiments with blocked design using Echo Planner Imaging, in which illusory contour (IC) (Kanizsa's square) and control objects (no contour: NC; real contour: RC) were passively presented. Subjects underwent ERP (event-related potentials) sessions using identical stimuli with fMRI studies, and then LORETA (low resolution brain electromagnetic tomography) was reconstructed using ERPs. Controls exhibited more eminent activations for IC in the extrastriate cortex encompassing the V2 area than did schizophrenics. In contrast, schizophrenics demonstrated more prominent activations for IC in the right anterior cingulate gyrus (ACC) and bilateral middle frontal gyrus than those of controls. Comparing LORETA values of ERPs for IC at each time frame between patients and controls, patients showed greater current density in the left insula than that of controls. Schizophrenics might be deficient in perceptual integration during processing in the extrastriate cortex, which might consequently increase the loads needed for higher processing in the prefrontal cortex reflected by the enhanced fMRI activation in ACC. Otherwise, an ambiguous object like IC, unless processed optimally at the pre-attentive level, might be perceived as disgusting stimuli and evoke activation in the insula of schizophrenic patients.

Keywords: LORETA; fMRI; ERP; Extrastriate; Schizophrenia; Illusory contour

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