fMRI indices of frontal activation associated with sensory gating deficits in schizophrenia

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Deficits in the ability to filter sensory information are often reported in schizophrenia. One extensively implemented measure of sensory gating is the recovery cycle of the P50 component of the auditory evoked potential. Schizophrenics do not exhibit the diminished P50 response to repeated auditory stimuli that is demonstrated in healthy control subjects (Adler et al., 1982). Although evidence indicates that hippocampal activity contributes to the generation of the P50 component, it has been hypothesized that P50 may be modulated by the activity of the dorsolateral prefrontal cortex (DLPFC) (Knight et al., 1999). Specifically, diminished P50 suppression in patients with DLPFC lesions has been postulated to result from reduced frontal inhibition of sensory input to the temporal lobe (Alho et al., 1994). This evidence supports the role of the DLPFC in the filtering of irrelevant stimuli and the hypothesis that the DLPFC may be involved in the modulation of P50 sensory gating. The current study examined the relationship between DLPFC and hippocampal activity, measured by fMRI, during a sensory gating paradigm in 20 healthy controls and 10 schizophrenic patients. Results demonstrated intact sensory gating in healthy controls, characterized as reduced hippocampal activity during the Task conditions. Schizophrenics did not display a reduction in hippocampal activity during the Task conditions, indicating failure to suppress P50 activity and abnormal sensory gating. Healthy controls exhibited enhanced DLPFC activation during Task conditions that could be related to P50 modulation. Schizophrenic patients displayed an unpredicted enhancement in DLPFC activity across Baseline and Task conditions, possibility due to engagement of frontal regions in non-specific task demands. The present study found preliminary evidence of DLPFC involvement in sensory gating in controls and disruption of sensory gating circuitry in schizophrenic subjects.

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目录:

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