Parahippocampal Gray Matter Density in Panic Disorder: A Voxel-Based Morphometric Study

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Objective: The authors examined possible cerebral gray matter abnormalities in patients with panic disorder.

Method: Gray matter concentration in 18 panic disorder outpatients and 18 healthy subjects was compared by using a voxel-based morphometry approach.

Results: Gray matter density of the left parahippocampal gyrus was significantly lower in patients with panic disorder compared with healthy subjects.

Conclusions: This result provides further support for the involvement of the parahippocampal area in the pathophysiology of panic disorder.

Discussion

We found left parahippocampal gyrus gray matter deficits in our group of panic disorder patients. To our knowledge, this is the first study to analyze patients with panic disorder by using voxel-based morphometry.

Our results are relevant in view of previous neuroimaging findings. On the one hand, panic disorder has been associated with a variety of structural brain abnormalities, mostly involving the temporal lobes (1–4). On the other hand, functional neuroimaging studies (PET and SPECT) have provided strong evidence for an abnormal function of the temporal lobe. Reiman et al. (9) found an abnormal hemispheric asymmetry of parahippocampal blood flow and oxygen metabolism in panic disorder patients in the resting, nonpanic states. Despite some relevant methodological limitations, such asymmetry was interpreted as an abnormal increase in right parahippocampal measurements. Glucose metabolism asymmetry in both the hippocampal and parahippocampal structures was later reported (10), which also suggests an increase in glucose metabolic rates on the right side. Similar results were found studying asymptomatic, imipramine-treated panic disorder patients (11), suggesting that such abnormality could reflect a trait marker for the illness. However, the picture is not that clear, since lower perfusion indices both in the right and left hippocampal regions (12) and a significant increase in glucose metabolism in the left hippocampus and parahippocampal area in women (13) have been also reported in panic disorder. Despite these rather inconsistent findings, our results could suggest that the left-to-right parahippocampal asymmetries described in most functional neuroimaging studies reflect compensatory mechanisms possibly due to gray matter deficits in the left parahippocampal region.

In summary, our results support the involvement of the parahippocampal gyrus in the pathophysiology of panic disorder. However, further studies with larger patient group sizes seem mandatory to clarify possible clinical
differences (in terms of panic disorder, panic disorder with agoraphobia, and agoraphobia without panic disorder) and gender differences and to elucidate whether parahippocampal gray matter deficits precede the onset of the disorder or appear as a consequence of it.

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