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A PET provocation study of generalized social phobia

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Abstract

In an investigation of the neural circuits that may mediate the subjective experience of social phobia (SP), six male patients with a primary DSM-IV diagnosis of generalized social phobia watched, in the presence of a group of "communication experts," a videotape of themselves giving an impromptu talk (Exposure condition). In the control Baseline condition, they viewed a videotape of a socially competent stranger giving a talk. Regional cerebral blood flow was measured thrice under each condition. The study revealed significant deactivations from Baseline during Exposure in the right lingual gyrus (BA 18) and in the right medial frontal gyrus (BA 11); significant activations during Exposure were not observed. Deactivation of these regions may reflect a strategy of visual avoidance employed by the patients to dampen their phobic experience.

Keywords: Social phobia; Neuroimaging; Positron emission tomography; Neurobiology; Anxiety disorders; Social anxiety disorder; Anxiety

1. Introduction

Individuals with social phobia (SP) fear that they will do something or show anxiety symptoms that will result in humiliation or embarrassment. Accordingly, these individuals fear and avoid a wide variety of social and performance situations in which they face unfamiliar persons or possible scrutiny by others (American Psychiatric Association, 1994). Situations typically avoided include the following: public speaking; speaking at meetings and/or in small groups; giving presentations; meeting strangers; attending social gatherings; eating, writing, or working in front of others; and dealing with authority figures. SP is considered generalized (GSP) if the fears and/or avoidance behaviors include most social and performance situations. The majority of individuals with social phobia who present for treatment have GSP. Effective

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treatments for GSP include cognitive-behavioral therapy (CBT) (Taylor, 1996) and pharmacotherapy (Van Ameringen and Mancini, 2001). While current first-line pharmacological treatments for social phobia target the serotonergic system, different social fears likely have different developmental roots, and may be based on quite different neurobiological systems.

Recent research employing a variety of strategies such as chemical and neuroendocrine challenges, evaluations of neurotransmitter functioning, and neuroimaging has begun to show promise for revealing the neurobiology of GSP (Van Ameringen and Mancini, 2004). For instance, functional neuroimaging studies have used provocation paradigms to induce social and performance anxiety through either scripted imagery or social performance. Studies employing scripted imagery found that SP individuals are distinguished from controls by heightened brain activity in regions including the bilateral insular cortex, right middle temporal gyrus, frontal pole, lateral orbital frontal cortex, right dorsolateral prefrontal cortex and left parietal cortex (Kelsey et al., 2000; Malizia et al., 1997). Provocation through public performance was orchestrated in one study by requiring subjects to sing the alphabet during the PET scan and resulted in increased regional cerebral blood flow (rCBF) in the thalamus, midbrain, lateral prefrontal, midcingulate, and anterior temporal cortices of social phobic patients (Reiman, 1997). Public oral presentation in another imaging study increased rCBF in the amygdaloid complex and reduced rCBF (denoting reduced neural activity) in the parietal and secondary visual cortices of their SP subjects (Tillfors et al., 2001). While there appears to be little consensus across provocation studies, the research does point to altered function over a wide network of associated limbic structures in SP.

While provocation paradigms provide a powerful platform to explore the neurological underpinnings of social phobia, recent theoretical models of social phobia hint at ways in which these explorations might be refined further. According to Clark and Wells (1995), people with SP tend to view themselves from the perspective of an observer. This has been likened to seeing oneself through the eyes of a spectator or viewing oneself on videotape (Roth and Heimberg, 2001). Consistent with such a framework, the present experiment was designed to further examine the neuroanatomic systems involved in the experience of social anxiety by employing a provocation paradigm that places the subject in the position of a spectator. Specifically, in the Baseline condition, subjects viewed a videotape of a socially competent stranger giving a talk. In the Exposure condition, subjects viewed a videotape of themselves giving an impromptu talk while in the presence of a group of "communication experts."

2. Methods

2.1. Subjects

Participants in this study were (1) recently diagnosed with primary social phobia of the generalized subtype of at least 5 years' duration according to DSM-IV (SCID) criteria (First et al., 1995); (2) male; (3) right-handed; and (4) 18–45 years of age (mean=27.6 years). Exclusion criteria included (1) a concurrent diagnosis of panic disorder or agoraphobia, OCD, current alcohol or substance abuse, psychotic disorder or dementia; (2) a history of seizures or head injury with loss of consciousness; (3) a severe uncontrollable medical condition; (4) the use of any psychotropic medication in the preceding 6 weeks; or (5) primary or secondary major depression. The study was approved by the Research Ethics Board of Hamilton Health Sciences-McMaster University Medical Centre.

2.2. Procedure

After giving informed consent, participants completed a number of psychometric instruments, including the following (the means+S.D. of participants' scores are given in square brackets): the Fear Questionnaire [Social Phobia Subscale=29.1+3.8] (Marks and Mathews, 1979); Fear of Negative Evaluation Scale [27.3±2.6] and the Social Avoidance and Distress Scale [23.0±8.6] (Watson and Friend, 1969), the Beck Depression Inventory [16.3+10.8] (Beck et al., 1961), and the State–Trait Anxiety Inventory [State=53.9±14.8, Trait=59.4±11.9] (Spielberger et al., 1970), consistent with a primary SCID diagnosis of social phobia. Several weeks before the PET scan, a videotape of the participant was made in which the participant spoke on a topic individually tailored to focus on the subject's major areas of social