

# Brain imaging reveals breakdown of normal emotional processing

August 16 2007

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Brain imaging has revealed a breakdown in normal patterns of emotional processing that impairs the ability of people with clinical depression to suppress negative emotional states. Efforts by depressed patients to suppress their feelings when viewing emotionally negative images enhanced activity in several brain areas, including the amygdala, known to play a role in generating emotion, according to a report in the August 15 issue of *The Journal of Neuroscience*.

“Identifying areas in the nervous system that correlate to pathological mood states is one of the pressing questions in mental illness today,” says Carol Tamminga, MD, of the University of Texas Southwest Medical Center. Tamminga was not involved in the study.

Tom Johnstone, PhD, of the University of Wisconsin, and colleagues there and at Tufts University studied 21 adults diagnosed with major depressive disorder and 18 healthy subjects of comparable ages. Participants were asked to view a series of emotionally positive and negative images and then indicate their reaction to each one. Four seconds after the presentation of each picture, participants were asked either to increase their emotional response (for example, imagining a loved one experiencing what was depicted in the image), to decrease it, or simply to continue watching the image.

During the test, a functional magnetic resonance imaging scanner detected changes in neural activity. Johnstone and his colleagues also recorded levels of emotional excitement by measuring pupil dilation.

The data showed distinctive patterns of activity in the ventromedial prefrontal cortex (VMPFC) and the right prefrontal cortex (PFC), areas that regulate the emotional output generated from the amygdala. The VMPFC is compromised in depression, likely because of the inappropriate engagement of right PFC circuitry in depressed individuals.

“These findings underscore the importance of emotional regulation deficits in depression,” says Johnstone. “They also suggest targets for therapeutic intervention.”

According to previous research, normal interaction between the amygdala and the VMPFC may underlie the proper adaptation of levels of the stress hormone cortisol on a daily basis. These levels do not vary as widely in people with major depressive disorder; future research may now be able to clarify the mechanism that underlies this aspect of depression. It could also examine the possibility of using measurements of activity in the amygdala to predict the effectiveness of treatments for depression such as cognitive behavioral therapy.

Source: Society for Neuroscience

Citation: Brain imaging reveals breakdown of normal emotional processing (2007, August 16) retrieved 22 September 2024 from

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