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Structural deficits may explain mood-independent cognitive difficulties in bipolar disorder

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A new study in *Biological Psychiatry*: *Cognitive Neuroscience and Neuroimaging* using magnetic resonance imaging (MRI) reports a link between reduced functional activation and reduced cortical thickness in the brains of patients with bipolar disorder. The abnormalities were found in patients not currently experiencing depression or mania, which suggests that there is a structural basis for altered neural processing that may help explain why cognitive deficits persist even during periods of normal mood.

Dr. Cameron Carter, Editor of Biological Psychiatry: Cognitive Neuroscience and Neuroimaging, noted the study is "an elegant synthesis of task fMRI and structural MRI" that shows a unique relationship between structure and function in bipolar disorder.

In the first study to assess the relationship between structural and functional MRI data in bipolar disorder, Dr. Shantanu Joshi and his colleagues at the University of California, Los Angeles focused on brain regions that play a role in mood dysregulation in the disorder. They examined the brains of 45 patients with bipolar disorder who were between mood episodes and 45 controls.

While performing a task intended to activate specific regions of the brain, patients had reduced activation, when compared to the control group, in two brain regions critical for inhibitory control: the inferior

frontal cortex and anterior cingulate cortex. The patients also had reduced activation in the superior frontal gyrus, a region important for motor planning and decision making.

Structural MRI revealed disease-related reductions in cortical thickness in the same regions: the inferior frontal cortex, anterior cingulate cortex, and superior frontal gyrus. Activation of the anterior cingulate cortex correlated with cortical thickness.

"These brain areas may underlie some of the cognitive difficulties experienced by bipolar patients independent of mood," Dr. Joshi commented. Until this study, researchers had little insight into the underlying causes of abnormal functional brain activity in the disorder. The findings support the idea that reduced activation in brain regions responsible for inhibitory control could explain impulsivity traits present in bipolar disorder.

"Since these changes were seen in remitted patients they may reflect an ongoing vulnerability related to the pathophysiology of this common and disabling severe mood disorder," Carter added.

According to Dr. Joshi, the study has potential implications for finding structure-function imaging signatures, known as biomarkers, for bipolar disorder that could be used to inform future intervention studies.

More information: Shantanu H. Joshi et al. Relationships Between Altered Functional Magnetic Resonance Imaging Activation and Cortical Thickness in Patients With Euthymic Bipolar I Disorder, *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging* (2016). DOI: 10.1016/j.bpsc.2016.06.006

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