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BRAIN CONNECTIVITY ABNORMALITIES IN BIPOLAR DISORDER DURING A WORKING MEMORY TASK

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Introduction: Bipolar Disorder (BD) is associated with abnormalities in brain functional engagement during working memory tasks. Neuroimaging studies have consistently shown that working memory (WM) engages a distributed neural network that primarily includes the dorsolateral prefrontal (DLPFC), the parietal (PAR) and the anterior cingulate cortices (ACC).

Objectives: To measure connectivity between the WM engaged areas in BD patients and healthy controls (HC).

Aims: To provide a mechanistic account of the differences observed in short-term neuroplastic responses between BD patients and HC during a WM task.

Methods: To achieve this we measured effective connectivity between the PAR, ACC and DLPFC using Dynamic Causal Modeling (DCM) of functional magnetic resonance imaging data obtained from forty-six HC and forty-one BD patients during a verbal 2–back task.

Results: Our data demonstrate that WM was associated with increasing forward (i.e. posterior to anterior) effective connectivity within the WM network for both diagnostic groups, while the HC showed right-hemisphere dominance compared to BD patients that showed left-hemisphere dominance. Furthermore, BD patients showed significant reduced connectivity from the left to the right DLPFC ($p = 0.003$) and vice versa ($p = 0.002$) compared to HC, as well as an decreased connectivity for the backward connection from the left DLPFC to the left ACC ($p = 0.026$).

Conclusions: Our results indicate that for the BD group there is abnormal functional integration of brain regions involved in WM processes, especially between the left and right DLPFC, regions involved in cognitive control.

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