Abstract

Introduction: The occurrence of depressive episodes in bipolar disorder (BD) and major depressive disorder (MDD) often leads to misdiagnosis and inappropriate treatment, negatively affecting the course of the illness. The dissertation summarizes clinical, epidemiological, and key neurobiological differences between these disorders, with a focus on resting-state functional magnetic resonance imaging (rs-fMRI) differences in the context of resting-state networks. Following the inconsistent results from previous studies, Study 1 conducted a meta-analysis of studies comparing rs-fMRI activity in MDD and BD patients during depression. Subsequently, Study 2 used novel exploratory functional connectivity multivariate pattern analysis (fc-MVPA) on original data to identify whole-brain patterns of functional connectivity between the compared groups, which might not be detected by other methods.

Methods: In Study 1, a meta-analysis of coordinates of significant between-group differences was conducted using the ALE (Activation Likelihood Estimation) method. Data from 10 studies were included, encompassing a total sample of 234 BD and 296 MDD depressed patients, identified through systematic searches in PubMed, Web of Science, Scopus, and Google Scholar. In Study 2, fc-MVPA was applied to rs-fMRI scans from 41 BD, 40 MDD patients, and 63 healthy participants and post hoc analyses were conducted to characterize distinct between-group patterns of connectivity.

Results: The meta-analysis identified increased activity in the left insula and claustrum in MDD patients compared to BD patients. Fc-MVPA revealed distinct patterns of functional connectivity between right frontal pole and default mode network, visual network and motor network in MDD and BD patients.

Conclusions: In two studies aimed at detecting resting-state functional changes in patients with BD and MDD during a depressive episode, we identified two regions distinguishing the disorders in terms of activity or functional connectivity using different approaches. While differences in insular activity and connectivity are common findings in current research and represent a candidate for a neuroimaging marker distinguishing the two disorders, right frontal pole and its connectivity have only sporadically appeard in studies, mainly in resistant forms of the illness. Further research is needed to assess the signifikance of this finding.