DIAGNOSTIC IMAGING IN BIPOLAR DISORDER

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Background: Bipolar Disorder (BD) is amongst the leading causes of disability worldwide. Patients are further disadvantaged by delays in accurate diagnosis ranging between 5-10 years. We applied Gaussian Process Classifiers (GPCs) to structural magnetic resonance imaging (sMRI) data to evaluate the feasibility of using pattern recognition techniques for the diagnostic classification of patients with BD.

Methods: GPCs were applied to gray (GM) and white matter (WM) sMRI data derived from two independent samples of patients with BD (cohort 1: n=26; cohort 2: n=14). Within each cohort patients were matched on age, sex and IQ to an equal number of healthy controls.

Results: The diagnostic accuracy of the GPC classifier for GM was 73% in cohort 1 and 72% in cohort 2; sensitivity and specificity of the GM classification were 69% and 77% in cohort 1 and 64% and 99% in the cohort 2. The diagnostic accuracy of the GPC classifier for WM was 69% in cohort 1 and 78% in cohort 2; sensitivity and specificity of the WM classification were both 69% the cohort 1 and 71% and 86% in cohort 2. In both samples, GM and WM clusters discriminating between patients and controls were localized within cortical and subcortical structures implicated in BD.

Conclusions: Our results demonstrate the predictive value of neuroanatomical data in discriminating patients with BD from healthy individuals. The overlap between discriminative networks and regions implicated in the pathophysiology of BD supports the biological plausibility of the classifiers.