Neurobiological support to the diagnosis of ADHD in stimulant-naïve adults: pattern recognition analyses of MRI data


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Abstract

Objective
In adulthood, the diagnosis of attention-deficit/hyperactivity disorder (ADHD) has been subject of recent controversy. We searched for a neuroanatomical signature associated with ADHD spectrum symptoms in adults by applying, for the first time, machine learning-based pattern classification methods to structural MRI and diffusion tensor imaging (DTI) data obtained from stimulant-naïve adults with childhood-onset ADHD and healthy controls (HC).

Method
Sixty-seven ADHD patients and 66 HC underwent high-resolution T1-weighted and DTI acquisitions. A support vector machine (SVM) classifier with a non-linear kernel was applied on multimodal image features extracted on regions of interest placed across the whole brain.

Results
The discrimination between a mixed-gender ADHD subgroup and individually matched HC (n = 58 each) yielded area-under-the-curve (AUC) and diagnostic accuracy (DA) values of up to 0.71% and 66% (P = 0.003) respectively. AUC and DA values increased to 0.74% and 74% (P = 0.0001) when analyses were restricted to males (52 ADHD vs. 44 HC).

Conclusion
Introvert personality traits showed independent risk effects on suicidality regardless of diagnosis status. Among high risk individuals with suicidal thoughts, higher neuroticism tendency is further associated with increased risk of suicide attempt.