Inconsistency in abnormal brain activity across cohorts of ADHD-200 in children with attention deficit hyperactivity disorder

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Many papers have shown results from the multi-site dataset of resting-state fMRI (rs-fMRI) in attention deficit hyperactivity disorder (ADHD), a data-sharing project named ADHD-200. However, few studies have illustrated that to what extent the pooled findings were consistent across cohorts. The present study analyzed three voxel-wise whole-brain metrics, i.e., the amplitude of low-frequency fluctuation (ALFF), regional homogeneity (ReHo) and degree centrality (DC) based on the pooled dataset as well as an individual cohort of ADHD-200. In addition to the conventional frequency band of 0.01-0.08 Hz, sub-frequency bands of 0.01-0.027, 0.027-0.073, 0.073-0.198 and 0.198-0.25 Hz, were assessed. While the pooled dataset showed abnormal activity in some brain regions, e.g., the bilateral sensorimotor cortices, bilateral cerebellum, and the bilateral lingual gyrus, these results were highly inconsistent across cohorts, even across the three cohorts from the same research center. The standardized effect size was rather small. These findings suggested a high heterogeneity of spontaneous brain activity in ADHD. Future studies based on multi-site large-sample data set should be performed on pooled data and single cohort data respectively and the effect size must be shown.