Abnormal developmental trajectories of amplitude of low-frequency fluctuations within intrinsic connectivity networks for school-age boys with ADHD

Xun-Heng Wang, Yun Jiao, Lihua Li, Zhongxiang Ding

Neuropsychiatry (London) (2016) 6(6), 344–350

ABSTRACT

Background:
ADHD is a prevalent brain disorder in school-age children. To our knowledge, the development of intrinsic connectivity networks (ICNs) remains unclear for children with ADHD. The goals of this paper are two-folds: 1) modelling the ICN-related brain connectivity based on phenotype scores; 2) exploring the altered growth curves of ICNs for ADHD.

Methods and Findings:
A cohort of boys with ADHD and a cohort of normal controls were recruited from ADHD-200 Consortium. The amplitude of low-frequency fluctuations (ALFFs) was applied to measure the brain connectivity within ICNs. Quantic models consisted of age; IQ, behavioural scores and head motion were applied to investigate the relationships between brain developments and intra-ICN ALFFs. The results found that the lateral visual network and executive control network were nonlinearly correlated to ageing in both ADHD group and normal control group. Based on intra-ICN ALFFs, the turning points of brain developments might be 11-12 years old for ADHD.

Conclusions:
The lateral visual network, cerebellum network, auditory network, and executive control network might play important roles in the brain development of ADHD. The abnormal developmental trajectories of ADHD could be discovered by intra-ICN ALFFs, which could be a potential biomarker for functional connectome.