The effects of cognitive-behavioral therapy on intrinsic functional brain networks in adults with attention-deficit/hyperactivity disorder

Xiaoli Wang, Qingjiu Cao, Jinhui Wang, Zhaomin Wu, Peng Wang, Li Sun, Taisheng Cai, Yufeng Wang

Behaviour Research and Therapy (November 2015)
DOI: http://dx.doi.org/10.1016/j.brat.2015.11.003

Abstract
Cognitive-behavioral therapy (CBT) is an efficacious psychological treatment for adults with attention-deficit/hyperactivity disorder (ADHD), but the neural processes underlying the benefits of CBT are not well understood. This study aims to unravel psychosocial mechanisms for treatment ADHD by exploring the effects of CBT on functional brain networks. Ten adults with ADHD were enrolled and resting-state functional magnetic resonance imaging scans were acquired before and after a 12-session CBT. Twelve age- and gender-matched healthy controls were also scanned. We constructed whole-brain functional connectivity networks using graph-theory approaches and further computed the changes of regional functional connectivity strength (rFCS) between pre- and post-CBT in ADHD for measuring the effects of CBT. The results showed that rFCS was increased in the fronto-parietal network and cerebellum, the brain regions that were most often affected by medication, in adults with ADHD following CBT. Furthermore, the enhanced functional coupling between bilateral superior parietal gyrus was positively correlated with the improvement of ADHD symptoms following CBT. Together, these findings provide evidence that CBT can selectively modulate the intrinsic network connectivity in the fronto-parietal network and cerebellum and suggest that the CBT may share common brain mechanism with the pharmacology in adults with ADHD.