

Deficient neural activity subserving decision-making during reward waiting time in intertemporal choice in adult ADHD.

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Abstract

AIM:
Impulsivity, which significantly affects social adaptation, is an important target behavioral characteristic in interventions for attention deficit hyperactivity disorder (ADHD). Typically, people are willing to wait longer to acquire greater rewards. Impulsivity in ADHD may be associated with brain dysfunction in decision making involving waiting behavior under such situations. We tested the hypothesis that brain circuitry during a period of waiting, i.e., prior to the acquisition of reward, is altered in adults with ADHD.

METHODS:

The participants included 14 medication-free adults with ADHD and 16 healthy controls matched for age, gender, intelligence quotient (IQ), and handedness. The behavioral task had participants choose between a delayed, larger monetary reward and an immediate, smaller monetary reward, where the reward waiting time actually occurred during functional magnetic resonance imaging measurement. We tested for group differences in the contrast values of blood oxygenation level dependent (BOLD) signals associated with the length of waiting time, calculated using the parametric modulation method.

RESULTS:

While the two groups did not differ in the time discounting rate, the delay-sensitive contrast values were significantly lower in the caudate and visual cortex in individuals with ADHD. The higher impulsivity scores were significantly associated with lower delay-sensitive contrast values in the caudate and visual cortex.

CONCLUSION:

These results suggest that deficient neural activity affects decision-making involving reward waiting time during intertemporal choice tasks, and provides an explanation for the basis of impulsivity in adult ADHD.