

# Reduced Prefrontal Hemodynamic Response in Adult Attention-Deficit/Hyperactivity Disorder as Measured by Near-Infrared Spectroscopy.

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## Abstract

### AIM:

Recent developments in near-infrared spectroscopy have enabled non-invasive clarification of brain functions in psychiatric disorders. In pediatric attention-deficit/hyperactivity disorder, reduced prefrontal hemodynamic responses have been observed with near-infrared spectroscopy repeatedly. However, there are few studies of adult attention-deficit/hyperactivity disorder by multi-channel near-infrared spectroscopy. Therefore, in this study, we used multi-channel near-infrared spectroscopy to examine the characteristics of prefrontal hemodynamic responses during the Stroop color-word task in adult attention-deficit/hyperactivity disorder patients and in age- and sex-matched control subjects.

### METHODS:

Twelve treatment-naïve adults with attention-deficit/hyperactivity disorder and 12 age- and sex-matched healthy control subjects participated in the present study after giving consent. We used 24-channel near-infrared spectroscopy to measure the oxyhemoglobin changes at the frontal lobes of participants during the Stroop color-word task. We compared the oxyhemoglobin changes between adults with attention-deficit/hyperactivity disorder and control subjects by t-tests with Bonferroni correction.

### RESULTS:

During the Stroop color-word task, the oxyhemoglobin changes observed in the attention-deficit/hyperactivity disorder group were significantly smaller than those in the control group in channels 11, 16, 18, 21, 22, 23 and 24, correspond to the prefrontal cortex. At channels 16, 21, 23 and 24 of the attention-deficit/hyperactivity disorder group, there were negative correlations between the symptomatic severity and the oxy-Hb changes.

### CONCLUSION:

The present study suggests that adults with attention-deficit/hyperactivity disorder have reduced prefrontal hemodynamic response as measured by near-infrared spectroscopy.