# Regional Cerebral Blood Flow Differences in ADHD Subtypes Among Children

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## OBJECTIVES

To identify regional cerebral blood flow (rCBF) differences among children with varying Attention-deficit/hyperactivity disorder (ADHD) subtypes

## METHODS

N = 3,222

- Participants were part of an archival de-identified database that received SPECT scans at baseline
- The sample consisted of ADHD classifications:
  - Asymptomatic (N=773)
  - Combined type (N=1,157)
  - Hyperactive (N=25)
  - Inattentive (N=479)
  - Mostly impulsive (N=122)
  - Mostly inattentive (N=633)
  - Undetermined (N=33)
- The sample consisted of 70.3% males and 29.4% of females, with Caucasians (N=1,652), African Americans (N=58), Hispanic (N=79), Asians (N=42), and unknown (N=1,391)
- A one-way between-subjects ANCOVA was performed controlling for age and gender, where ADHD type was the independent variable and brain region was the dependent variable

## RESULTS

- The main effect of ADHD type was statistically significant for the baseline left occipital, $F(7, 3425) = 2.462$, $p = .016$, $\eta_p^2 = .005$
- Post hoc tests showed there was a significant difference between the hyperactive and mostly impulsive group (p=.043), where the hyperactive group demonstrated higher rCBF perfusion

*Table 1. Main Effect of ADHD Type Controlling for Age and Gender*

| Brain Region | F-value | p | $\eta_p^2$ |
|---|---|---|---|
| Baseline Left Occipital | 2.462 | .016 | .005 |

*Table 2. Bonferroni Post Hoc Analysis for ADHD Type and Baseline Left Occipital*

| | Mean Difference | Standard Error | p |
|---|---|---|---|
| Hyperactive and Mostly Impulsive Group | 6.662 | 2.099 | .043 |

## CONCLUSIONS

- Research is limited regarding rCBF perfusion among ADHD subtypes, with no research on the hyperactive subtype
- This is the first study providing evidence that youth diagnosed with hyperactive subtype may have increased activation across brain regions as compared to other subtypes
- Specifically, our results suggest there may be increased activity in the brain region that is primarily responsible for visual processing among children in the ADHD hyperactive group
- Previous research have primarily highlighted structural and functional differences in the brains of children with ADHD
- Although there is limited research on rCBF perfusion in the occipital lobe among ADHD subtypes, previous research indicate differences in gray matter volumes, cortical thickness, and surface area within the occipital lobe
- SPECT imaging may be useful in determining differences between ADHD subtypes and their resulting behavioral and cognitive functioning
- Limitations of this study included the use of DSM-IV-TR rather than DSM-5 diagnosis criteria

## REFERENCES

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