Genetic imaging study with [Tc-99m] TRODAT-1 SPECT in adolescents with ADHD using OROS-methylphenidate.


Abstract

AIM:
To examine the effects on the brain of 2-month treatment with a methylphenidate extended-release formulation (OROS-MPH) using [Tc-99m] TRODAT-1 SPECT in a sample of treatment-naïve adolescents with Attention Deficit/Hyperactivity Disorder (ADHD). In addition, to assess whether risk alleles (homozygosity for 10-repeat allele at the DAT1 gene were associated with alterations in striatal DAT availability.

METHODS:
Twenty adolescents with ADHD underwent brain single-photon emission computed tomography (SPECT) scans with [Tc-99m] TRODAT-1 at baseline and two months after starting OROS-MPH treatment with dosages up to 1 mg/kg/day. Severity of illness was estimated using the Clinical Global Impression Scale (CGI-S) and DuPaul ADHD Rating Scale-Clinician version (ARS) before treatment, 1 month and 2 months after initiating OROS-MPH treatment.

RESULTS:
Decreased DAT availability was found in both the right caudate (pretreatment DAT binding: 224.76 ± 33.77, post-treatment DAT binding: 208.86 ± 28.75, p = 0.02) and right putamen (pretreatment DAT binding: 314.41 ± 55.24, post-treatment DAT binding: 285.66 ± 39.20, p = 0.05) in adolescents with ADHD receiving OROS-MPH treatment. Adolescents with ADHD who showed a robust response to OROS-MPH (n = 7) had significantly greater reduction of DAT density in the right putamen than adolescents who showed less robust response to OROS-MPH (n = 13) (p = 0.02). However, between-group differences by treatment responses were not related with DAT density in the right caudate. Risk alleles (homozygosity for the 10-repeat allele of DAT1 gene) in the DAT1 gene were not associated with alterations in striatal DAT availability.

CONCLUSION:
Two months of OROS-MPH treatment decreased DAT availability in both the right caudate and putamen. Adolescents with ADHD who showed a robust response to OROS-MPH had greater reduction of DAT density in the right putamen. However, our findings did not support an association between homozygosity for a 10-repeat allele in the DAT1 gene and DAT density, assessed using [Tc-99m] TRODAT-1 SPECT.