

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

Akay AP, Kaya GÇ, Kose S, Yazıcıoğlu ÇE, Erkurun HÖ, Güney SA, Oğuz K, Keskin D, Baykara B, Emiroğlu Nİ, Eren MŞ, Kızıldağ S, Ertay T, Özsoylu D, Miral S, Durak H, Gönül AS, Rohde LA.

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Abstract

AIM:
To examine the effects on the brain of 2-month treatment with a methylphenidate extended-release formulation (OROS-MPH) using [^{99m}Tc] 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 [^{99m}Tc] 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 (pre-treatment 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 [^{99m}Tc] TRODAT-1 SPECT.