Relationship between the DAT1 gene and the effects of methylphenidate administration in adult attention deficit hyperactivity disorder: a magnetic resonance spectroscopy study.


Abstract

OBJECTIVE:
This study investigated the relationship between DAT1 gene polymorphisms and the effects of methylphenidate (MPH) administration on N-acetyl aspartate (NAA), creatine (Cr), and choline (Cho) levels in the anterior cingulate cortex, prefrontal cortex, striatum, and cerebellum in adult patients with attention deficit hyperactivity disorder (ADHD). This was the first study to investigate the relationship between DAT gene variable number tandem repeat (VNTR) polymorphisms and the responses of brain metabolites to MPH.

PATIENTS AND METHODS:
Samples in this study were collected from 60 patients aged between 18 and 60 years with ADHD according to DSM-IV criteria. Genetic analysis of DAT1 gene polymorphisms was carried out using blood samples obtained after a detailed clinical evaluation. Levels of NAA, Cr, and Cho were measured in the anterior cingulate cortex, prefrontal cortex, striatum, and cerebellum by magnetic resonance spectroscopy. After this evaluation, 10 mg of MPH was given orally to patients, and the levels of the same metabolites were measured 30 min later.

RESULTS:
No marked difference in NAA, Cr, or Cho levels was detected before and after MPH administration with respect to the DAT1 gene VNTR polymorphisms. A considerable increase in Cr levels in the cerebellum was identified after MPH administration in individuals with the 10/10 repeat genotype as the DAT1 VNTR polymorphism (p=0.008).

CONCLUSIONS:
An increase in the previously decreased blood flow after MPH therapy may induce an increase in creatine levels in patients with the 10/10 repeat genotype. Our results thus suggest that the 10R allele as the DAT1 gene VNTR polymorphism might be associated with MPH-related changes in brain metabolites in adults with ADHD.