Does Methylphenidate Improve Inhibition in Adults with ADHD?

Marije Boonstra [1,2], Sandra Kooij [3], Joe Sergeant [4], Jaap Oosterlaan [4], & Jan Buitelaar [5]

[1] UMC Utrecht; [2] Erasmus University, Rotterdam; [3] MC Parnassia, Den Haag; [4] Vrije Universiteit, Amsterdam; [5] UMC St. Radboud, Nijmegen

Background

According to many researchers (e.g., Barkley, 1997; Nigg, 2001), impulsivity or decreased behavioral inhibition (withholding an inappropriate response) is the most significant symptom of ADHD. In children, the ameliorating effect of methylphenidate (*Mph*) on laboratory tests of inhibition has been demonstrated repeatedly. In adults with the disorder, there is a surprising lack of studies into this effect.

Mph has also been shown to improve several other cognitive processes in children with ADHD, such as variability of response execution, response re-engagement, and attentiveness. Again, little information is available for the adult ADHD population.

Hypotheses

- Mph improves behavioral inhibition in adults with ADHD.
- Mph improves variability of response execution, response re-engagement and attentivenesss in adults with ADHD.

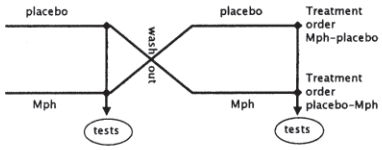
Method

Sample

n = 43 (21 M & 22 F) adults with ADHD
age 38.4 (*SD* 10.1); IQ 100.3 (*SD* 17.9)
naive to treatment with Mph

Design

Double blind, cross over, placebo-controlled study with Mph. Tests were administered during the third week of individually titrated treatment with Mph (mean dose .93 mg/kg) and during the third week of treatment with placebo.



Measures

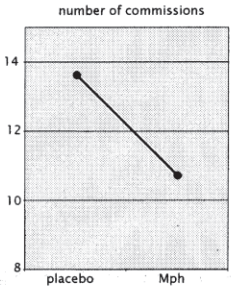
- Conners' Continuous Performance Test (*CPT*) (Conners, 1995)
- Change Task (*ChT*) (Logan & Burkell, 1986), an extended version of the Stop Signal Test

Results

Inhibition

CPT Commissions

There was no interaction between treatment condition (placebo or Mph) and treatment order (placebo-first or Mph-first) ($F(5,35)=2.12$, $p=.09$). Therefore, the two treatment order groups were analyzed as one.

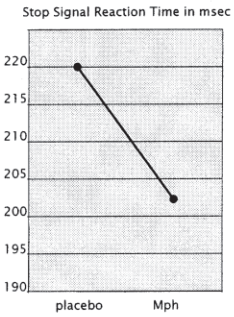


$F(1,42) = 10.88$
$p = .00$
$\eta^2 = .21$

Inhibition

ChT Stop Signal Reaction Time

There was no interaction between treatment condition (placebo or Mph) and treatment order (placebo-first or Mph-first) ($F(1,38)=.01$, $p=.91$). Therefore, the two treatment order groups were analyzed as one.

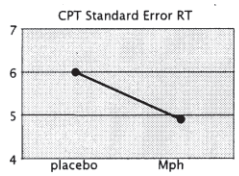


$F(1,41) = 3.08$
$p = .09$
$\eta^2 = .07$

With a sub-sample (n=28) who showed SSRTs on placebo lower than that of the normal control sample of Epstein et al. (2001), we established a very large improvement of SSRT with Mph ($F(1,23)=21.19$, $p=.00$, $\eta^2 = .48$).

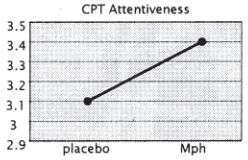
Other processes

Variability of response execution



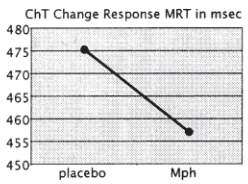
$F(1,42) = 7.15$
$p = .01$
$\eta^2 = .15$

Attentiveness (d')



$F(1,42) = 8.17$
$p = .01$
$\eta^2 = .16$

Response Re-engagement



$F(1,41) = 4.84$
$p = .03$
$\eta^2 = .11$

Discussion

Mph improved behavioral inhibiton as measured by commission errors on the CPT in adults with ADHD. This large effect however, could only be established the ChT for a sub-sample with low SSRTs on placebo. Possible explanations for the this deviation may be found in the doses of Mph (Tannock et al. (1995) found strongest Mph effects on medium doses); the kind of ChT used (Band et al. (2002) noted that a tracking version of the test provides the most reliable estimation of SSRT); differences in the nature of the CPT and the ChT, for instance an auditory versus a visual stimulus that signals inhibition; and differences in level of difficulty between the two tests (Tannock et al. (1989, 1995) found smaller effects for the ChT than for the easier Stop Signal Test).

Next to positive effects of Mph on inhibition on the CPT, we found that Mph decreased variability in response execution and increased attentiveness on the CPT. We also established that the drug caused faster response re-engagement on the ChT.

As well as inducing positive clinical effects in adults with ADHD (see Wilens et al. 2002), Mph seems to ameliorate problems with inhibition and several other cognitive abilities in adults with the disorder.

The paper this poster has been based on, has just been accepted for publication in the Journal of Clinical and Experimental Neuropsychology.
Correspondence about this poster should be addressed to the first author, who is currently employed at Erasmus University: Boonstra@fsw.eur.nl