
Methylphenidate place conditioning in adolescent rats: An analysis of sex differences and the dopamine transporter

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Abstract

In two experiments, we analyzed the effects of methylphenidate (MPH) on conditioned place preference (CPP) in adolescent male and female rats, and the effects of MPH on the dopamine transporter (DAT). In Experiment 1, male and female rats were conditioned for 5 consecutive days from postnatal day (P)44 to P48 with saline, 1, or 5 mg/kg MPH. On the post conditioning preference test, the group administered the 1 mg/kg dose of MPH resulted in no significant preference compared to controls, whereas the 5 mg/kg dose of MPH produced a robust significant preference for the paired context, but there were no sex differences. Analysis of the DAT revealed that animals conditioned with the 5 mg/kg dose of MPH demonstrated a significant decrease of the dopamine transporter (DAT) in the nucleus accumbens and striatum compared to controls. In Experiment 2, animals were conditioned using an every second day paradigm from P33–41 to model a previous MPH treatment regimen that had revealed sex differences in behavioral sensitization. MPH produced an increased preference for the paired context on a post-conditioning preference test in Experiment 2, but as in Experiment 1, no sex differences were observed. These data show that a relatively high dose of MPH has rewarding associative effects in both adolescent male and female rats reliably across two different conditioning paradigms and ages in adolescence, but no sex difference. In addition, MPH results in a significant decrease of the DAT in drug reward brain areas which has implications toward plasticity of the brain's reward system.

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