A behavioral and pharmacological assessment of the spontaneously hypertensive rat as a model for attention-deficit hyperactivity disorder

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Attention-deficit hyperactivity disorder (ADHD) is a highly prevalent but frequently misdiagnosed disorder characterized by hyperactivity, impulsivity and attentional deficits. ADHD is most frequently treated with methylphenidate (Ritalin). Because the diagnosis itself is not without controversy, modeling ADHD in animals is difficult. As a result, many animal models for ADHD exist, of which the spontaneously hypertensive rat (SHR) is the most-used model. The goal of the present experiment was to assess the predictive and face validity of the SHR as a model for ADHD. The effects of methylphenidate on activity, attention and impulsivity were measured. WKY and Wistar rats were used as control strains.
Open field: Although SHR showed hyperactivity in the open field, this was not lowered by methylphenidate. Elevated locomotor activity of the WKY after repeated exposure to the open field, however, was attenuated by methylphenidate.
Acquisition-reversal-extinction battery: A test battery was used to assess general operant ability of the SHR. The results show that although acquisition and reversal were normal compared to control strains, extinction was slower in the SHR.
DRL: In the DRL, animals are rewarded for pressing a lever, but only if the previous response was more than 72 s before. SHR received less rewards and burst more, but only Wistar performance was increased with administration of methylphenidate.
Five-choice serial reaction time task: In this operant task, animals are rewarded for responding to brief light stimuli presented randomly in one of five holes. Wistar controls were more impulsive than both SHR and WKY, and this impulsivity was lowered by methylphenidate.
Although the spontaneously hypertensive rat shows ADHD-like symptoms, methylphenidate did not alleviate those symptoms. The present experiments do not support the spontaneously hypertensive rat as a predictive animal model for ADHD.

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