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The Effect of Methylphenidate on the Microstructure of Schedule-Induced Polydipsia in an animal model of ADHD

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Abstract

Schedule-induced polydipsia (SIP) was established in spontaneously hypertensive rats (SHR), Wistar Kyoto rats (WKY), and Wistar rats, using a multiple fixed-time (FT) schedule of food delivery, with 30- and 90-s components. Thereafter, animals were exposed to methylphenidate (MPH; 2.5 mg/kg/d) for six consecutive SIP sessions. A test to assess possible sensitization effects was also conducted four days after termination of the drug treatment. At baseline, FT 90-s produced longer and more frequent drinking episodes in SHR than in WKY. An analysis of the distribution of inter-lick intervals revealed that drinking was organized in bouts, which were shorter in SHR than in WKY. Across strains and schedules, MPH shifted drinking episodes towards the beginning of inter-food intervals, which may reflect a stimulant effect on SIP. MPH transiently reduced the frequency of drinking episodes in WKY in FT 30-s, and more permanently reduced the frequency of licking bouts in Wistar rats. MPH also increased the length of licking bouts in Wistar rats. Overall, SHR displayed a hyperactive-like pattern of drinking (frequent but short bouts), which 2.5 mg/kg MPH appears to reduce in WKY and Wistar but not in SHR rats. It appears that therapeutic effects of MPH on hyperactive-like SIP require higher doses in SHR relative to control strains.

Keywords: Schedule-induced polydipsia, Methylphenidate, Attention-deficit hyperactivity disorder, Bouts, Spontaneously Hypertensive Rat, Wistar Kyoto rats.