IMPLICATION OF THE NUCLEUS ACCUMBENS SHELL, BUT NOT CORE, IN THE ACUTE AND SENSITIZING EFFECTS OF COCAINE IN RATS

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Expression of cocaine-evoked motor behaviors appears to be dependent on dopamine neurotransmission particularly in the target area of the mesolimbic system, i.e. the nucleus accumbens (NAc). To test potential anatomic component of the locomotor effects of cocaine and expression of its behavioral sensitization, male Wistar rats were implanted with bilateral cannulae aimed at the two subregions of the NAc (the shell or the core) and then intracranially injected with cocaine (locomotor activity) or injected with cocaine given either systemically or intracranially following the repeated (5 days) systemic drug administration (sensitization). Sensitization was measured at early (5-day) and late (21-day) withdrawal periods. Acute administration of intra-NAc shell cocaine (6.73–50 µg/side) in a dose-dependent manner increased locomotor activity in rats; significant hyperactivation was observed after 25 and 50 µg/side of cocaine. Intra-NAc core injection of cocaine (12.5–50 µg/side) did not change rats’ locomotor activity. After 5- or 21-day withdrawal, behavioral sensitization (ca. 2 times higher locomotor activity than that after acute drug administration) was observed when cocaine was injected either systemically (10 mg/kg) or intra-NAc shell (12.5–25 µg/side) in animals repeatedly treated with cocaine (10 mg/kg). No difference was observed in the response to the challenge with intra-NAc core cocaine (12.5–25 µg/side) in rats treated repeatedly with cocaine at either withdrawal period. The above findings show the differential regulation of motor responses to cocaine within the subregions of the NAc. They also indicate a preferential effect for the NAc shell in expression of the acute and sensitizing effects of cocaine in rats.

Key words: cocaine, locomotor activity, sensitization, nucleus accumbens, microinjection, rats

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