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WATER AND ELECTROLYTE HOMEOSTASIS

Prenatal and early postnatal dietary sodium restriction sensitizes the adult rat to amphetamines

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Acute sodium deficiency sensitizes adult rats to psychomotor effects of amphetamine. This study determined whether prenatal and early life manipulation of dietary sodium sensitized adult offspring to psychomotor effects of amphetamine (1 or 3 mg/kg ip) in two strains of rats. Wistar-Kyoto (WKY) and spontaneously hypertensive (SHR) dams were fed chow containing low NaCl (0.12%; LN), normal NaCl (1%; NN), or high NaCl (4%; HN) throughout breeding, gestation, and lactation. Male offspring were maintained on the test diet for an additional 3 wk postweaning and then fed standard chow thereafter until testing began. Overall, blood pressure (BP), total fluid intake, salt preference, and adrenal gland weight were greater in SHR than in WKY. WKY LN offspring had greater water intake and adrenal gland weight than did WKY NN and HN offspring, whereas WKY HN offspring had increased BP, salt intake, and salt preference compared with other WKY offspring. SHR HN offspring also had increased BP compared with other SHR offspring; all other measures were similar for SHR offspring. The low-dose amphetamine increased locomotor and stereotypical behavior compared with baseline and saline injection in both WKY and SHR offspring. Dietary sodium history affected the rats' psychomotor response to the higher dose of amphetamine. Injections of 3 mg/kg amphetamine in both strains produced significantly more behavioral activity in the LN offspring than in NN and HN offspring. These results show that early life experience with low-sodium diets produce long-term changes in adult rats' behavioral responses to amphetamine.

salt appetite; psychomotor stimulant; behavioral activity

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