EFFECTS OF *d*-AMPHETAMINE ON BODY TEMPERATURE AND ON BEHAVIORAL THERMOREGULATION IN RATS

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WE HAVE previously shown that the administration of *d*-amphetamine (7·5–15·0 mg/kg i.p.) to rats (100–150 g body wt) kept in a cold ambient temperature (4°C–15°C) causes a significant decrease in colonic temperature (from 37·0°C to 34·6°C after 60 min) (YEHUDA and WURTMAN 1972a). This effect is apparently mediated by dopaminergic brain neurons inasmuch as it is blocked by pretreatment with haloperidol (2.0 mg/kg), pimozide (25·0 mg/kg) or ditran (4·0 mg/kg) but not by propranolol (12·0 mg/kg) or phenoxybenzamine (20·0 mg/kg). Similar effects on body temperature is produced by L-dopa (100·0 mg/kg) apomorphine (10·0 mg/kg) and clonidine (2·0 mg/kg). The hypothermic effect of *d*-amphetamine is blocked by lesions that destroy the dopaminergic system in the limbic forebrain (i.e., the olfactory tubercules and adjacent tissues) (YEHUDA and WURTMAN, 1972b).

Present studies show that *d*-amphetamine also causes paradoxical thermoregulatory behavior. If rats are kept at a cold ambient temperature (4°C) and allowed to locate themselves at various distances from the beam of a heating lamp the animals normally will place themselves under the lamp (about 80% of the time). *d*-Amphetamine administration causes rats to choose to avoid the lamp. This effect is also blocked by pimozide (5·0 mg/kg), haloperidol (2·0 mg/kg) and spiroperidol (2·0 mg/kg) and to some extent by phenoxybenzamine (10·0–20·0 mg/kg). Animals placed in a warm environment (20°C–30°C) will normally avoid the beam of the heat lamp; *d*-amphetamine administration causes them to choose to place themselves under the lamp. The effect is also blocked by pimozide, haloperidol and sprioperidol, but not by phenoxybenzamine.

These results indicate that among those effects of *d*-amphetamine probably mediated by central dopaminergic neurons (e.g., stereotyped behavior and rotational behavior) are its effects on body temperature thermoregulatory responses. The hypothermic effect may lend itself to use in screening dopamine receptor stimulants, and dopamine-receptor blocking agents, (including antipsychotic agents).

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REFERENCES

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