

THE EFFECT OF DOPAMINE ON URINE COMPOSITION IN THE ADRENALECTOMISED RAT

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Evidence now exists that, in the rat as in other species, dopamine (DA) administration induces diuresis and natriuresis (Akpaffiong et al, 1979). Although the mechanisms responsible have not been clearly elucidated, recent results have implicated the renin-angiotensin system (Kuchel et al, 1978).

To investigate this possibility we have examined the effects of DA in adrenalectomised rats. After bilateral adrenalectomy, at least 10 days was allowed to elapse before experimental use. Groups of 3 male Wistar rats (University of Bath strain) were starved overnight, loaded p.o. with either saline (adrenalectomised) or water (sham-operated) and placed in metabolism cages. Urine was collected over a 6h period during which further fluid and all food was withheld.

Table 1 shows that in adrenalectomised rats, DA produced a dose-dependent diuresis, but the natriuresis produced in normal animals was absent. Since adrenalectomised animals were maintained on normal saline rather than water, the amount of Na⁺ excreted was higher than normal, which could possibly explain the failure of DA to induce further natriuresis. When Na⁺ excretion was raised in normal animals by either pretreatment with 3% NaCl or injection of frusemide 100mg.kg⁻¹s.c. DA did not produce natriuresis, confirming that raised basal levels of Na⁺ excretion could have influenced the results.

Injection of aldosterone 20µg.kg⁻¹s.c. did not change urine composition in adrenalectomised rats although this same dose caused the expected retention of Na⁺ in control animals. When aldosterone injection was followed after 2h by injection of DA, urine volume was significantly increased but no changes were observed in absolute amounts of Na⁺ or K⁺ excreted.

The results do not allow firm conclusions to be drawn on the natriuretic action of DA but demonstrate that DA has a diuretic action which is independent of the adrenals, and which is not affected by aldosterone.

Table 1 Dopamine in adrenalectomised and normal rats - 6h collection period

Dopamine mg.kg ⁻¹	Adrenalectomised				Normal			
	n	Urine (ml)	Na ⁺ MEq.L ⁻¹	K ⁺ MEq.L ⁻¹	n	Urine (ml)	Na ⁺ MEq.L ⁻¹	K ⁺ MEq.L ⁻¹
control	4	1.8±0.3	103.8±3.4	38.9±3.3	8	4.0±0.4	3.4±0.3	14.3±1.6
1	4	2.3±0.2	80.0±7.6*	31.2±1.4	3	4.8±0.2	7.3±0.7***	13.0±0.3
10	4	4.9±1.4*	51.7±8.0***	14.6±4.1***	3	6.0±0.2*	12.8±1.8***	4.1±0.1***
30	4	4.8±1.2*	46.3±6.1***	8.6±1.8***	3	7.4±0.2**	15.0±0.3***	4.1±0.1***

Means ±S.E.M. difference from control: * - p<0.05; ** - p<0.01; *** - p<0.001

Akpaffiong, M.J., Redfern, P.H., Woodward, B. (1979) J.Pharm.Pharmac. 31: 17P
 Kuchel, O., Bun, N.T., Unger, T.H., Genest, J. (1978) Clin.Sci. Mol. Med.
 55: 77-80s