hypotension and bradycardia after propranolol in the SHR. Central injection of propranolol into a lateral brain ventricle of adrenalectomized rats (0.5–1.5 mg/kg) caused cardiovascular changes which were less pronounced as compared to peripheral injection of comparable doses. These results point to a peripheral site of action for propranolol under these conditions. Parasympathetic activation does not seem to be responsible for the bradycardia or hypotension since neither bilateral vagotomy nor pretreatment with atropine (5 mg/kg i.p.) prevented the cardiovascular effects of propranolol in adrenalectomized rats.

The inhibitory effects of propranolol are not restricted to the SHR, since similar effects were observed in the normotensive Wistar-Kyoto rat. However, in the adrenalectomized normotensive- or renal hypertensive Wistar rat no cardiovascular changes were observed with propranolol. This implies a strain dependent effect for propranolol.

In conclusion, in the Wistar-Kyoto strain adrenalcorticosteroids do prevent the lowering of blood pressure and heart rate after propranolol. Whether the inhibitory effects in the absence of these steroids are caused by an action on the heart or the peripheral vasculature remains to be determined.

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Changes in plasma renin levels of normotensive and spontaneously hypertensive rats with increasing age

M.D. DAY, A. HUSAIN & C.W. JONES

Department of Physiology and Pharmacology, Medical School, Queen's Medical Centre, Nottingham

Renin levels in the plasma of spontaneously hypertensive rats (SHR) have been variously reported to increase, decrease or remain unchanged with age (for references see Shiono & Sokabe, 1976). The apparently equivocal nature of these results may have resulted from comparisons between rats which were based on small age difference.

The present study describes renin levels in the plasma of SHR (bred at Queen's Medical Centre) and control normotensive Wistar rats (NR) (obtained from Messrs. Bantin & Kingman Ltd.) aged between 11 and 235 days. Rats were divided into groups according to their age and allowed free access to food

Table 1 Mean systolic b.p. (± s.e. mean) and mean plasma renin concentration (PRC) (± s.e. mean) for groups of normotensive and spontaneously hypertensive rats at various ages from 11 to 235 days. (N = number of rats in each age group). Systolic blood pressure is expressed in mm Hg and PRC in ng angiotensin I generated ml^{-1} h^{-1}

	Normotensive Wistar rats			*Spontaneously hypertensive rats*		
Age (days)	*n*	*Systolic B.P.*	*PRC*	*n*	*Systolic B.P.*	*PRC*
11–13	6		16.3 ± 4.7	5		28.7 ± 2.8†
25–32	6		12.6 ± 3.1	3		18.2 ± 2.8*
44–46	6	133 ± 3	4.4 ± 1.7*	6	162 ± 7	7.8 ± 0.8*
60	6	135 ± 2	8.3 ± 2.9	6	198 ± 6	12.2 ± 2.0
92–96	6	140 ± 1	15.0 ± 5.0	6	217 ± 6	28.5 ± 2.8*†
158	6	141 ± 3	15.2 ± 2.7			
230–235	6	135 ± 3	19.9 ± 4.5	6	242 ± 8	27.5 ± 1.5

Notes: It was technically not possible to measure b.p. of rats less than about 40 days old. A group of SHR rats of 158 days old was not available. Differences between adjacent pairs of PRC's marked with an asterisk (*) were statistically significant ($P < 0.05$). Differences between corresponding pairs of PRC's for normotensive compared with hypertensive rats marked with (†) were statistically significant ($P < 0.05$).

and water. Systolic blood pressure was measured in the unanaesthetised rat by the tail cuff method (Bunag, 1973) between 08.00 and 10.00 h on one day and again 48 h later; the rats were killed by cervical dislocation 24 h after the second blood pressure measurement. Blood was collected immediately by heart puncture (in the youngest group blood was collected by decapitation). Renin concentration in plasma was measured by radioimmunoassay for generated angiotensin I using a modification of the method of Poulsen & Jorgensen (1974). The results are summarised in Table 1 and indicate that the levels of renin in the plasma of NR and SHR initially decrease with increasing age until the rats are 44 to 46 days old, but rise subsequently. Following the initial decrease, the rate of rise in plasma renin levels in the SHR was more pronounced than that in the NR, and the levels of renin of the SHR after 90 days were about twice those of the NR. It is concluded that plasma renin levels change with increasing age in NR and SHR and that the changes follow a similar pattern.

A. Husain is supported by a studentship from the Medical Research Council.

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Effect of centrally administered noradrenaline and isoprenaline on splanchnic nerve activity in anaesthetised and conscious cats

M.D. DAY & J. SEMPIK

Department of Physiology and Pharmacology, Medical School, Queen's Medical Centre, Nottingham

The recording of splanchnic nerve activity in various laboratory species has been used as an index of sympathetic tone in order to demonstrate a central action of some antihypertensive drugs. For instance, Schmitt, Schmitt & Fénard (1974) reported a reduction in splanchnic nerve activity in the conscious dog following i.v. injection of clonidine, and Lewis & Haeusler (1975) observed a fall in splanchnic nerve activity after i.v. infusion of propranolol in the conscious rabbit. We have recorded splanchnic nerve activity in both consious and anaesthetised cats in order to provide further evidence to support the contention (Day, Poyser & Sempik, 1976) that pressor responses evoked by the administration of noradrenaline or isoprenaline into the third cerebral ventricle were elicited by actions of these substances on structures within the brain.

The experiments were performed in 6 anaesthetised (chloralose 70 mg/kg i.v.) and 6 conscious cats. Blood pressure was recorded from a femoral artery in anaesthetised animals and from an indwelling carotid catheter in conscious animals; heart rate was obtained from the blood pressure pulse. Nerve activity was recorded from bipolar tungsten electrodes implanted on the greater splanchnic nerve by a method similar to that described by Haeusler & Lewis (1976). In both series of experiments cannulae were inserted stereotaxically into the third ventricle.

In the control situation bursts of electrical activity recorded from the splanchnic nerve coincided with respiration and the amplitude of the discharges varied between 20–120 μV in each experiment.

I.v. injection of noradrenaline (0.5 – 1 μg/kg) caused a brief rise in arterial blood pressure associated with a reflex bradycardia and a fall in splanchnic nerve activity. On the other hand, infusion of noradrenaline (15 μg) into the IIIrd ventricle of anaesthetised cats caused an increase in blood pressure and heart rate with a concomitant increase of 30–40% in splanchnic nerve activity. Noradrenaline (5–10 μg) infused into the IIIrd ventricle of conscious cats produced similar effects on the cardiovascular system and on sympathetic nerve activity.

Infusion of isoprenaline (5 μg) into the IIIrd ventricle of conscious cats caused rises in arterial blood pressure and splanchnic nerve activity; the time course of these responses was similar to those produced by equipressor amounts of noradrenaline administered by this route.

These results provide further evidence of the central nature of the pressor responses to III ventricle noradrenaline and isoprenaline in the cat.

J. Sempik is an SRC C.A.S.E. award student sponsored by Beecham Pharmaceuticals, Research Division. The advice of Dr. R.H. Poyser of Beecham Pharmaceuticals during the course of this study is appreciated.