LETTER TO THE EDITOR

EFEECT OF SOME DRUGS ON BLOOD PRESSURE AND HEART RATE OF ANAESTHETIZED DOGS DURING EXPERIMENTALLY INDUCED ACIDOSIS AND ALKALOSIS

Sir,

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Disturbances of acid-base balance are encountered in clinical practice. Whether responses to agonists are altered during such states is not well documented. Effects of certain drugs during experimentally induced acid-base disturbances in dogs are described below.

Male mongrel dogs were used. Methods of inducing acidosis and alkalosis described by Lew *et al* (5) were followed with modifications. Metabolic acidosis was induced by oral administration of ammonium chloride (5.3 g/day for five days) (n=10). Control animals (n=6) were given sodium chloride (5.85 g/day) in the same manner. Animals were used for the experiments on the sixth day. Metabolic alkalosis was induced under pentobarbitone anaesthesia by iv administration of 200 *ml* of 0.5 M sodium bicarbonate solution over 10 min followed by infusion at the rate of 5 *ml*/5 min (n=10). Experiments were started immediately afterwards. Controls (n=6) were treated in the same manner using sodium chloride (0.5 M) solution.

Anaesthesia was induced by sodium pentobarbitone 35 *mg/kg*, iv. Blood pressure (B.P.) was recorded with a mercury manometer and heart rate (H.R.) was calculated from E.C.G. lead II. Arterial blood pH was estimated before and after the experiment with

the gas analyses. (pH range: Acidosis; 7.180 to 7.228, Alkalosis; 7.620 to 7.646). Rectal temperature was maintained at 37 ± 0.5 °C. Responses to bilateral carotid occlusion (BCO) and to iv administration of following drugs were recorded: (—) - adrenaline chloride, (—) - noradrenaline bitartrate (±) - Isoprenaline sulphate and acetylcholine bromide (each as 2 μg base/kg) and histamine acid phosphate (20 μg base/kg). The drugs were given in the same sequence and the responses were elicited in duplicate. Students unpaired "t" test was used for analysis of the data. Because of the crudeness of exoerimental methods, only those changes which were of an arbitrarily defined magnitude viz. change in B.P.$\geqslant$15 mm Hg and in HR$\geqslant$15 beats/min were analsyed.

The basal B.P. and H.R. were significantly increased during both acidosis and alkalosis (Table I). This could be due to stimulations of release of catecholamines during

TABLE I : Resting blood pressure (B.P.) and Heart Rate (H.R.) of dog during induced acid-base imbalance.

	Acidosis (7.180 to 7.228) (n=10)	*Control - I (7.340 to 7.346) (n=6)*	*Alkalosis (7. 620 to 7.646) (n=10)*	*Control - II (7.340 to 7.344) (n=6)*
B.P. (mm Hg)	148.00 ±4.22*	128.33 ±3.07	145.40 ±1.46*	128.33 ±2.28
H.R.	174.60 ±1.55*	162.33 ±1.20	173.60 ± 0.83*	166.67 ±2.17

Values are mean (±SEM). *P<0.05

acidosis (6) or the reversible positive inotropic effect of alkalosis on the myocardium (1). Responses to BCO were recorded to assess the integrity of cardiovascular reflexes. The potentiation of responses to BCO observed during both acidosis and alkalosis, may be due to alterations in adrenoceptors (7) and overactivity of nervous system (3) respectively. During metabolic acidosis, the intensity of effect of catecholamines on B.P. and H.R. was found to be significantly ($P<0.05$) decreased (Table II). This is in aggrement with that reported by Houle *et al.* (4). The intensity of change in B.P. after administration of catecholamines was unaltered during metabolic alkalosis, although the degree of change in H.R. was significantly ($P<0.05$) reduced (Table II). During acidosis and alkalosis the intensity of effect of acetylcholine and histamine was significantly decreased. Alterations in cardioinhibitory effects of acetylcholine in dogs have been reported to be correlated with changes in blood pH (2). The same may be true for histamine.

TABLE II : Change in B.P. and H.R. after bilateral carotid occlusion and administration of various drugs in anaesthetised dogs with induced acid-base imbalance,

No.	Treatment	ACIDOSIS				ALKALLOSIS			
		B.P.		H.R.		B.P.		H.R.	
		Exp. Group	Control Group	Exp. Group	Control Group	Exp. Group	Control Group	Exp. Group	Control Group
1.	Carotid occlusion	22.30 ±3.16*	17.50 ±0.34	3.60 ±0.66	2.67 ±0.42	25.60 ±0.69*	16.83 ±0.51	2.60 ±0.34	2.33 ±0.33
2.	Adrenaline	16.80 ±0.85	21.67 ±0.67	30.20 ±0.76	37.67 ±1.58	24.40 ±0.78	22.00 ±0.89	32.40 ±0.84	39.00 ±1.44
3.	Noradrenaline	21.50 ±0.40*	24.00 ±0.68	−17.40 ±0.48	−25.67 ±1.48*	24.20 ±0.76	23.83 ±0.89	−21.40 ±0.73*	−27.00 ±1.10
4.	Isoprenaline	20.40 ±0.64*	23.00 ±0.68	73.20 ±0.90*	83.00 ±1.98	19.60 ±0.40*	23.00 ±0.86	76.60 ±1.40*	86.33 ±1.31
5.	Acetylcholine	24.20 ±0.65*	32.00 ±1.15	32.60 ±1.04	30.00 ±0.89	26.60 ±1.09*	32.33 ±1.20	30.60 ±0.90	30.67 ±0.42
6.	Histamine	34.80 ±0.84*	42.00 ±0.73	10.00 ±0.68	16.33 ±1.50	26.80 ±1.24*	43.00 ±0.86	11.00 ±0.54	19.00 ±0.68

All drugs were given repidly iv, catecholamines and acetylcholine; 2 μg base/kg : Histamine ; 20 μg/kg, All values are mean (±SEM) (*P<0.05)

We have recorded the agonistic effects of the drugs on B.P. and H.R. when pH was altered from normal (7.340 to 7.346) to acidic (7.180 to 7.228) or alkaline (7.620 to 7.646) side. None of the changes seem to be impressive or of a major magnitude, although the changes were seen to be statistically significant. One may therefore imply that such magnitude of change in blood pH is not likely to be of major applied significance, although results in dogs can not be interpolated to man.

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