

90 (2050)

Urine acidity after the injection of adrenalin chloride.

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The following experiment was planned to study the effect of adrenalin chloride upon the acidity of the urine, and to determine, if possible, whether the "acidosis" which has been described as one of the results of such injections was due to the respiratory changes which follow the administration of the drug. A normal man (the author) who weighed 165 pounds took a standard simple breakfast on each of four successive days. On each day hourly samples of urine were collected throughout the morning. The collection and determination of the degree of acidity was carried out by the method of Marshall¹; other determinations were done as described in previous papers². On the second day of the experiment 1 c.c. of a 1 to 1000 solution of adrenalin chloride (Parke-Davis) was injected subcutaneously into the arm. Samples of blood were collected from the median basilic vein one half hour before and one half, one, and two hours after the injection was given.

TABLE I

TIME	NOTES	URINE					BLOOD		BREATH
		Vol. c.c	Sp. Gr.	Reac. P _H	NH ₄ N mg.	T. N. mg.	CO ₂ vol. per cent.	Sugar per cent.	CO ₂ mm.
7:00	began								
8:00	breakfast	35	1.030	5.6	8.7	666			
8:40		25	5.8	5.0	447			
9:00	adrenalin	36	1.032	7.3	10.0	575	63.3	0.111	36
10:00		56	1.031	7.4	9.8	659	51.9	0.172	29
10:35		37	1.022	6.2	11.4	449	51.9	0.270	32
11:00		34	1.027	5.6	10.8	554			
11:35									
12:00									
12:35									
1:00									

¹ *J. Biol. Chem.*, 1922, li, 3.² Hubbard and Wright, *J. Biol. Chem.*, 1921, xlix, 385; Hubbard and Nicholson, *ibid.*, 1922, liii, 209.

The results are given in the tables. Table 1 shows that the subject developed the decrease in the carbon dioxide combining capacity of the plasma described by Peters and Geyelin³, and Hubbard and Wright (loc. cit.) as well as a rise in blood sugar. The determinations of the alveolar carbon dioxide tension were not very satisfactory, but they showed a decrease which roughly paralleled the changes in the carbon dioxide combining capacity of the plasma.

TABLE II

TIME.	VOLUME.		SP.	GR.	REACTION.		AMMONIA N.		TOTAL N.	
	cont. c.c.	exp. c.c.			cont.	exp.	cont. P _H	exp. P _H	cont. mg.	exp. mg.
7-8	34	35	1.037	1.031	5.7	5.6	5.6	8.7	524	666
	31		1.032		5.4		9.6		469	
	82.5		1.020		5.6		33.0		974	
8-9	34	25	1.034	6.7	5.8	4.8	5.0	486	447
	31		1.032		5.35		8.7		577	
	31.5		1.018		5.6		11.5		
9-10	28.5	36	1.031	1.032	7.35	7.3	3.6	3.6	418	575
	22			5.6		7.3		
	59		1.020		6.5		19.0		70.5	
10-11	29	56	1.029	1.031	7.1	7.4	4.8	9.8	387	659
	40		1.030		6.0		10.0		728	
	48		1.024		6.9		10.4		475	
11-12	42	37	1.029	1.032	6.8	6.2	6.2	11.4	529	419
	32		1.027		5.55		9.1		279	
	54		1.025		6.6		16.6		567	
12-1	34	1.027	5.6	10.8	554
	33		1.023		5.4		7.9		540	
	50		1.025		6.2		14.3		574	

Under "cont." (control) are listed the results from the experiments when no adrenalin was taken. These results are listed in sequence.

Under "exp." (experiment) are listed the results obtained on the second day—the day on which the adrenalin was given.

Table 2 shows the determinations made on the urine on the day when adrenalin was given contrasted with similar determinations on the three control days. The acidity of the urine alone showed any change, and that change was slight. The reaction of the specimen collected from eleven to twelve o'clock after the adrenalin was given showed a more marked increase in acidity (1.2 P_H) over the specimen collected during the preceding hour than did similar specimens on the control days.

³ *J. Biol. Chem.*, 1917, **xxx**i, 471.

This comparatively rapid passing of the "alkaline tide" was the only change in urine reaction found. The experiment certainly did not show an increased alkalinity of the urine after the administration of adrenalin comparable to that which follows polypnea⁴, but further experiments with increased amounts of adrenalin would be necessary to prove definitely that an increased urinary acidity results from the use of the drug. The marked tremor and other disagreeable symptoms experienced during the experiment make the undertaking of such investigations upon human subjects a rather serious matter.

The experiment reported furnishes some evidence that the lowered carbon dioxide combining capacity of the plasma which follows injection of adrenalin chloride does not resemble, in some of its accompanying phenomena, that which is produced by polypnea.

91 (2051)

Ingested fat and body fat as precursors of the acetone bodies.

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An experiment was carried out to determine whether body fat and ingested fat give rise to equal amounts of the acetone bodies. A normal woman took a diet which furnished twenty per cent. more calories than her calculated basal requirement, and which consisted of 45 grams of protein, 45 grams of carbohydrate, and 160 grams of fat. The excretion of aceto-acetic acid, β -hydroxybutyric acid, and nitrogen were determined daily by methods previously described¹. The amounts of the acetone bodies excreted were ten to twenty times the amounts excreted by the subject when she was on a normal diet, but the total amounts (0.25 grams of acetone from all of the acetone bodies)

⁴ Collip and Backus, *Am. J. Physiol.*, 1920, li, 568; Grant and Goldman, *ibid.*, 1920, lii, 209.

¹ Hubbard and Wright, *J. Biol. Chem.*, 1922, 1, 361.