ANIMAL PHYSIOLOGY

Mechanism of the Antidiuretic Effect of Vasopressin

It has been said that the antidiuretic effect of vasopressin, one of the posterior pituitary hormones, is based on accelerated re-absorption of water in the renal tubules.

S. Itoh reported that the intracellular concentration of chloride is reduced when 'Pitressin' (posterior pituitary extracts) is added to a suspension of red blood cells[1]. This chloride shift, of course, depends on the carbonic anhydrase activity in red blood cells.

I have examined manometrically the effect of posterior pituitary extracts (Pharm. Japonica) on the enzyme activity. Enzymes were extracted by chloroform and ethanol from cow's red blood cells by Roughton's method[2]. $M/5$ sodium bicarbonate which was dissolved in $N/50$ sodium hydroxide, and diluted 4 times with physiological saline, was used as substrate. As inhibitor of the enzyme 1·0 mgm./ml. solution of acetazolamide was used. Conditions of the experiment are given in Table 1.

TABLE 1.

Main compartment of Warburg's flasks:		A	B	C	D
Enzyme	(mgm.)	10	10	10	10
$M/5$-Phosphate buffer (pH 6·8)	(ml.)	1·4	1·4	1·4	1·4
Inhibitor	(ml.)	—	0·2	—	0·2
Posterior pituitary extract (5 mgm./ml.)	(ml.)	—	—	0·2	0·2
Distilled water	(ml.)	0·4	0·2	0·2	—
Sidearm:					
Substrate	(ml.)	0·2	0·2	0·2	0·2

Experiments were performed in air at 10°C.

Results are shown in Figs. 1 and 2. Fig. 2 shows each reaction speed by the finite difference method. It was noted that there was marked activation of the reaction caused by posterior pituitary extract.

The activators of the enzyme, however, are not yet definitely known[3]. Certain amino-acids, peptides and various tissue extracts are listed[4]; but there are many objections to these activators[5].

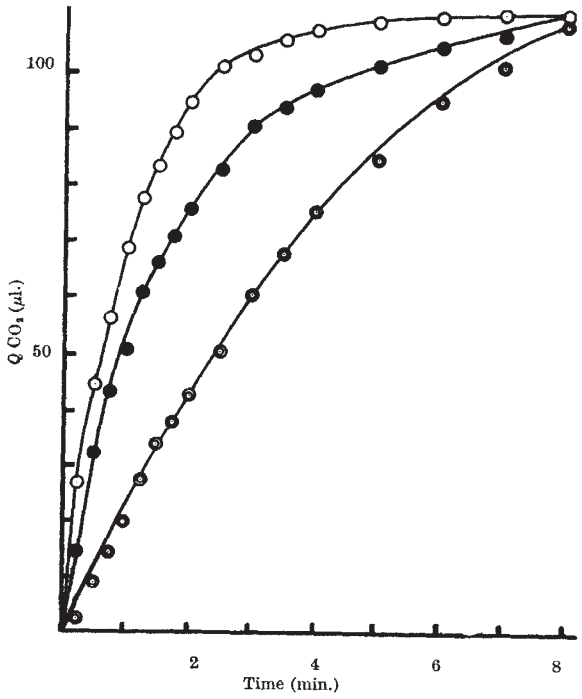

Fig. 1. ○——○, Posterior pituitary extract added; ●——●, basic reaction; ◎——◎, inhibition.

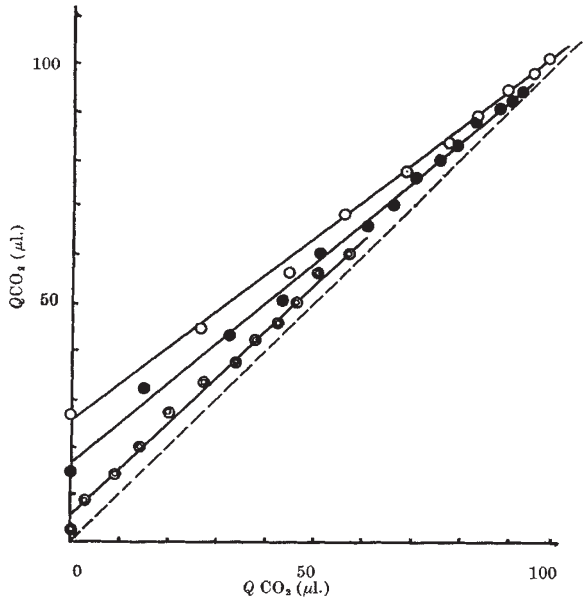

Fig. 2. ○——○, Posterior pituitary extract added; ●——●, basic reaction; ◎——◎, inhibition.

The results do not indicate clearly whether the activation of carbonic anhydrase, strictly speaking, is due to vasopressin or some impurities; but in my opinion the net mechanism of acceleration of re-absorption of water in renal tubules by vasopressin can be ascribed to the activation of this enzyme occurring in the tubule cells.

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[3] Roughton, F. J. W., and Clark, A. M., 'The Enzymes', ed. Sumner, J. B., and Myrbaeck, K., **1**, 1250 (1951).
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Intravascular and Intracardiac Blood Velocity Patterns recorded by means of *NTC* Resistors

NTC resistors ('thermistors') can be used for measuring intravascular blood flow[1,2]. The thermistor is heated by an electric current and cooled by the flowing blood. So its temperature is a function of the blood flow rate in its immediate environment, and since the thermistor's electric resistance increases some 5 per cent for a temperature drop of 1°C., resistance measurement provides a fairly sensitive method for the determination of flow. Mounting very small *NTC* beads in a cardiac catheter, Delaunois[3] succeeded in recording the blood flow in the large vessels without opening the thorax. An *NTC* bead, having a diameter of 0·5 mm. was placed in a small cavity made in the side wall of a catheter near the tip and fixed with a plastic cement. The quantitative determination of flow rates by this method has not yet been entirely successful because of several difficulties, such as the large influence of small blood temperature variations and the complicated calibration procedure.

We used thermistor catheters of the Delaunois type for recording velocity patterns rather than for