

## BIOCHEMISTRY AND BIOPHYSICS

### THE BIOLOGICAL IMPORTANCE OF VITAMIN P

#### COMMUNICATION I. DIURESIS AND SERUM PROTEIN COMPOSITION DURING ADMINISTRATION OF VITAMIN P

I. S. Belonosov, A. A. Konstantinov

From the Department of Biochemistry (Head - Docent

I. S. Belonosov) of the Medical Institute and the Biochemical Laboratory

(Head - Docent A. A. Konstantinov) of the Research Institute of Epidemiology and Hygiene, Khabarovsk

(Received April 10, 1959. Presented by Active Member AMN SSSR S. E. Severin)

There are only fragmentary reports in the literature on the mechanism of the physiological action of compounds exhibiting vitamin P activity.

Ya. N. Khodzhaï [1] studied the diuretic action of flavones, isolated from the everlasting flower, in experiments on rats. He found that the volume of diuresis depended on the dose of flavone. When given internally in a dose of 3-6 mg/kg body weight, flavone caused an increase in the excretion of urine per hour of 12-13%, but

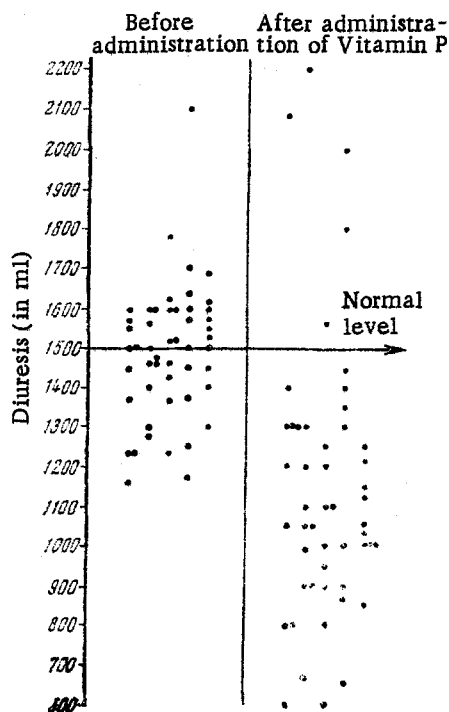


Fig. 1. The effect of vitamin P on diuresis in man.

did not alter the total urinary output during the period of observation. Doses of 7.5-10 mg/kg caused an increase in the volume of urine excreted during the first hour of 130-150% and also an increase in the total urinary output during the period of observation.

These findings suggested that it might be interesting to test the influence of vitamin P on diuresis in man. As a source of vitamin P we used a green tea preparation, produced by the Moscow Chemopharmaceutical Factory, containing 98.6% of tea catechols.

The 1.4% of impurities evidently consisted of mineral substances, chlorophyll and traces of caffeine, possessing an antidiuretic action.

When the vitamin P preparation was used in the treatment of Far Eastern hemorrhagic fever (patients received 150 mg of vitamin P twice a day for 2-5 days), we observed a fall of 28-31% in the diuresis and an increase in the toxicosis. Since the results obtained disagreed with Ya. N. Khodzhaï's findings mentioned above we decided to test the influence of our vitamin P preparation on diuresis in healthy human subjects. Observations were carried out on 50 healthy adult males (students), aged from 20 to 30 years. All the persons investigated received 300 mg of vitamin P (150 mg twice a day).

TABLE 1

The Effect of Repeated Administration of Vitamin P on Diuresis

Serial no.	Subject	Diuresis (in ml)					
		before ad- ministration of the vitamin	day after administration of the vitamin				
			1st	2nd	3rd	4th	5th
1	F	1 635	1 420	1 265	1 130	1 010	860
2	K	1 690	1 500	1 485	1 240	1 085	950
3	S	1 475	1 280	1 300	1 120	1 020	980

TABLE 2. The Effect of Vitamin P Saturation on the Concentration of Serum Protein and its Fractions in the Blood of Rabbits

Serum proteins	Time of in- vestigation	Serum protein concentration (in g %)		Concentration of protein fractions (relative %)	
		control	experiment	control	experiment
Total protein	I	6,53±0,58	7,30±0,30	—	—
	II	7,23±0,32	6,64±0,46	—	—
Albumins	I	3,90±0,17	4,20±0,20	59,70±2,60	57,50±2,74
	II	4,23±0,12	3,95±0,15	58,50±1,66	59,48±2,25
$\alpha_1$ -globulins	I	0,45±0,08	0,50±0,06	7,89±1,38	6,85±0,96
	II	0,66±0,06	0,40±0,07	9,12±0,83	6,02±1,05
$\alpha_2$ -globulins	I	0,64±0,12	0,62±0,09	8,80±1,64	8,50±1,23
	II	0,63±0,12	0,41±0,10	8,71±1,65	6,17±1,50
$\beta$ -globulins	I	0,68±0,19	0,89±0,12	10,40±2,90	12,22±1,64
	II	0,67±0,05	0,94±0,08	9,26±0,70	14,18±1,21
$\gamma$ -globulins	I	0,86±0,02	1,09±0,05	13,21±0,31	14,93±0,69
	II	1,04±0,10	0,94±0,04	14,41±1,39	14,15±0,60

Note. I) before administration, II) after administration. Vitamin P was given to the experimental animals, physiological saline to the controls.

The diuresis was measured during the 24 hours preceding the administration of vitamin P and during the 24 hours afterwards. The subjects were kept in identical conditions (attending their classes), on an ordinary diet, and with a steady water intake. The results of the investigations are shown in Fig. 1.

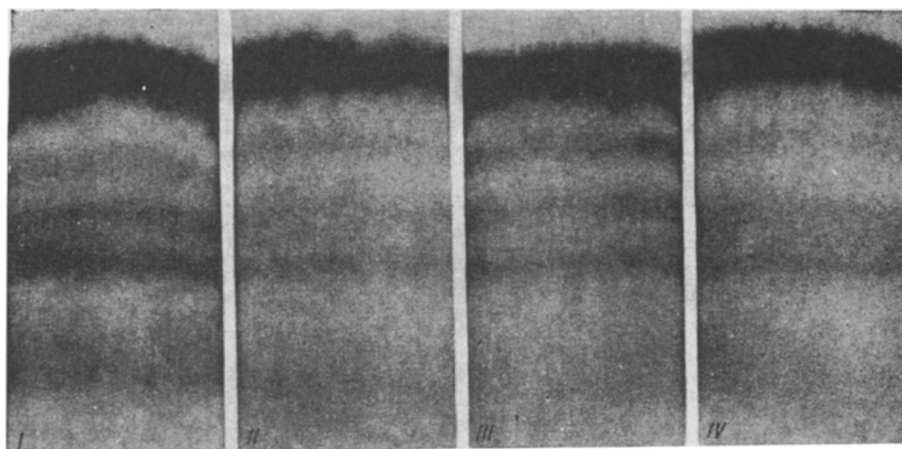


Fig. 2. Electrophoregram of the serum of the rabbits. I and III — before taking vitamin P; II and IV — after taking vitamin P.

Administration of vitamin P was found to lower the mean daily urine output from 1434 to 1145 ml, i.e., by an average of 21%. After the repeated administration of vitamin P (saturation was achieved after giving a daily dose of 300 mg of vitamin P for 5 days) a fall in diuresis developed, and as shown by the figures in Table 1, this was more sharply expressed.

The subjects observed a diminished sense of thirst.

Besides investigating the effect of vitamin P on diuresis, we also studied its effect on the protein fractions of the blood in rabbits. For a period of 5 days 10 rabbits were given by mouth 2.5 ml of a solution of vitamin P, equivalent to 25 mg/kg body weight/day. Samples of 1 ml of blood were taken from the rabbits before receiving vitamin P and after saturation with the vitamin, from the auricular vein, and the total serum protein was estimated refractometrically, and its fractions determined by the method of paper electrophoresis (Fig. 2).

In 5 other rabbits (controls) the composition of the serum proteins was also investigated. These rabbits were given physiological saline by mouth, in a daily dose of 2.5 ml, after which the serum of these rabbits was again investigated.

The results of these investigations are shown in Table 2.

It can be seen from Table 2 that the concentration of total protein and of  $\alpha_2$ - and  $\gamma$ -globulins falls after administration of vitamin P for 5 days, whereas the concentration of  $\beta$ -globulins rises slightly, although these changes were so slight that it is difficult to ascribe any importance to them. The effect of vitamin P on diuresis in man is so marked that it must be taken seriously into consideration when this vitamin is prescribed for patients.

#### SUMMARY

It has been demonstrated that vitamin P possesses a pronounced antidiuretic effect in man.

When the vitamin P was administered to rabbits the following changes were noted in their blood serum: a slight decrease in the concentration of the total protein,  $\alpha$  and  $\gamma$ -globulin fractions and some increase in the  $\beta$ -globulins.

#### LITERATURE CITED

- [1] Ya. N. Khodzhal, cited by S. M. Ryss, *The Vitamins*, 1954 [In Russian].