EFFECT OF PLACENTIN-3, A NEW PREPARATION FROM HUMAN PLACENTAL TISSUE, ON THE BLOOD CLOTTING SYSTEM*

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A new preparation from human placental tissue, placentin-3, when injected subcutaneously into dogs, activates the blood clotting system, shortening the clotting time.

The placenta plays an important role in the regulation of blood clotting [4,8,11]. It has been found that the principal substance in the placenta which influences blood clotting is thromboplastic factor, consisting of hyaluronic acid in combination with proteins [2,7,10].

In this investigation, the effect of a new substance obtained from human placental tissue, known as placentin-3, on the blood clotting system was studied.

EXPERIMENTAL METHOD

Placentin-3, at a temperature of 35-40°, is a sterile, yellowish, opaque liquid with viscosity 4.4 and pH 7.3. It is a protein preparation, including tissue thromboplastin, acetylcholine, nucleic acid, lipids, and so on. Experimental tests of the new substance have shown that it is harmless to the organism and possesses a wide spectrum of pharmacological properties.

Experiments were carried out on 43 mongrel dogs of both sexes. The following tests were carried out as indices of the state of the blood clotting system: clotting time of the blood [1], state of the factors of the prothrombin complex as a whole, the blood heparin tolerance [15], the plasma recalcification rate, and fibrinogen concentration [6], and the serum glycoprotein concentration [9].

The pharmacological properties of the substance were studied during long and short courses of its administration. In the long course, daily subcutaneous injections were given in a dose of 0.07 ml/kg body weight for 30 days. In the short courses, subcutaneous injections were given in a dose of 0.4 ml/kg body weight twice a day for 4 days.

EXPERIMENTAL RESULTS

The results given in Table 1 show that the blood clotting time was shortened after administration of placentin-3 for 30 days.

The rate of plasma recalcification in dogs after administration of the preparation fell by 17% compared with the control animals, while the blood heparin tolerance rose on the average by 14%. Analysis of the results of Quick's test on the experimental animals revealed no changes in the value of this index. No definite changes were observed likewise in the blood fibrinogen concentration. For instance, the mean fibrinogen level in the control dogs was 259 mg%, compared with a mean level of 257 mg% after administration of placentin-3. The study of changes in the serum glycoprotein fraction of dogs after injections of placentin-3 revealed an increase of 92% in the α_2-glycoprotein fraction. These tests suggest that the increase in α_2-glycoprotein fraction is related to an increase in activity of the blood clotting system due to an increase in the prothrombin concentration, because prothrombin is known to be a glycoprotein, a group of

*The substance placentin-3 is undergoing extensive clinical study.

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TABLE 1. Changes in Blood Clotting Time (in sec) of Dogs after a Long Course of Injections of Placentin-3

Statistical index	Before injection of substance		After injection of	
			placentin-3	physiological saline
	E	C	E	C
n	20	11	20	11
$M \pm m$	158±6	178±2	98±6	166±3
$\sigma \pm$	29	6	27	9
P	—	—	<0,001	0,004

Note. P, calculated relative to initial data; E, experiment; C, control.

substances whose electrophoretic mobility corresponds to that of α_2-globulin. However, this increase in the prothrombin concentration in the experimental animals was probably not sufficient to cause an increase in the prothrombin time (in Quick's test).

To study the mechanism of action of placentin-3, its thromboplastic activity was investigated in Quick's test. The mean clotting time of healthy human plasma is 81 sec. The results obtained indicate that placentin-3 contains tissue thromboplastin.

Experiments to study placentin-3 thus showed that the substance, when injected subcutaneously, activates the clotting system of the blood. This action of the substance on the body was probably due principally to the tissue thromboplastin which it contains. The β-lipoproteins and acetylcholine also present in placentin-3 likewise could increase the activity of the preparation. The ability of β-lipoproteins to take on the properties of thromboplastin has been proved [13,14]. The effect of acetylcholine on the clotting system of the blood could be effected through the automatic nervous system. Participation of the autonomic nervous system in the regulation of blood coagulation has been demonstrated experimentally [3,5,12].

In conclusion, it must be added that the preliminary results of clinical trials of placentin-3 at present in progress confirm its property of increasing the coagulating power of human blood.

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