

The trypsin and amylase activity and the sugar concentration of the blood were investigated in dogs after partial and total pancreatectomy. Activity of the enzymes rose on the first days after the operation, but starting from the 2nd week it was maintained within normal limits. The results themselves and their comparison with others published previously suggest that the pancreas is not the source of the trypsin-like activity of the blood.

It is considered that certain pancreatic enzymes, including trypsin, enter the blood stream under normal conditions [4, 7], where they activate the enzymes contained in it [3]. It is also known that trypsin, like other enzymes of the gastro-intestinal tract, can be absorbed into the blood from the intestine. This is shown by the absorption of radioactively labeled chymotrypsin [8], trypsin, and bromelain [9] when introduced per rectum and into the small intestine. According to the opposite view, the whole of the trypsin-like activity is accounted for by the blood enzymes and its has nothing to do with trypsin itself [10]. According to a third opinion, the trypsin-like activity of the blood is determined both by trypsin and by the blood enzymes (plasmin, thrombin, thrombokinas), and also by the C-component of complement and by kallikrein which, with inhibitors, form a sensitive system reacting to pathological changes not only in the pancreas but also in other organs [4]. In pancreatitis the blood serum trypsin level rises sharply, for its liberation into the blood is intensified [3, 6]. Other workers consider that this increase is nonspecific for it is temporary in character [5] and, in addition, it is observed in infarction, hepatitis, cirrhosis of the liver, enterocolitis, and colitis [4].

In this investigation the trypsin-like activity of the blood was studied in dogs after partial and total pancreatectomy.

EXPERIMENTAL METHOD

The trypsin-like activity of the blood serum of dogs was determined from the rate of hydrolysis of benzoyl-arginine-p-nitroaniline [3]. The amylase activity [3] and blood sugar concentration [1] also were investigated. The head of the pancreas (2/3 of the total tissue) and the duodenum were resected in 11 experimental animals and the continuity of the gastro-intestinal tract was then restored by end-to-end pancreaticojejunostomy, side-to-side cholecystjejunostomy, and end-to-side gastroenterostomy. In 4 other animals the pancreas was removed completely [2]. In these cases the integrity of the gastro-intestinal tract was not disturbed.

EXPERIMENTAL RESULTS

The results of investigation of the enzyme activity and sugar concentration in the blood after partial pancreatectomy are given in Table 1. On the day of the operation a sharp increase in enzyme activity and in the blood sugar was observed. Toward the end of the first week the level of these parameters fell, and during the 2nd and 3rd weeks they fluctuated within normal limits. No decrease in the blood trypsin level was observed.

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TABLE 1. Blood Trypsin and Amylase Activity and Sugar Concentration in Dogs after Partial Pancreatectomy (M ± m)

Parameter studied	Normal	After operation									
		days					weeks				
		0	1	2	3	4	5	6	2	3	4
Trypsin activity (in units)	1,5±0,34	5,5±0,47 0,01	6,1±0,8 0,001	2,5±0,8 0,5	—	2,5±1,4 0,5	3,5±1,4 0,2	1,9±1,6 0,5	2,2±0,4 0,2	1,1±0,3 0,01	2,0±0,5 0,5
Sugar concentration (in mg%)	68±2,7	89±10 0,05	82±7,1 0,1	76±4,2 0,1	82±5,5 0,02	63±2,4 0,2	65±7 0,5	60±3,6 0,1	65±2,5 0,5	66±3,5 0,5	65±7 0,5
Amylase activity (in units)	532±35	1013±141 0,01	914±67 0,001	1000±66 0,001	—	760±40 0,001	983±77 0,001	570±38 0,5	560±44 0,5	570±38 0,5	590±40 0,5

TABLE 2. Blood Trypsin and Amylase Activity and Sugar Concentration after Total Pancreatectomy (M ± m)

Parameter studied	Normal	After operation									
		days					weeks				
		1	2	3-4	5-6	2	3	4	5		
Trypsin activity (in units)	1,5±0,34	4,7±1,2 0,05	4,0±1,4 0,2	2,3±0,45 0,2	5,8±1,8 0,1	3,0±0,46 0,05	4,1±2,05 0,2	2,2±0,65 0,5	1,7±0,28 0,5		
Sugar concentration (in mg%)	68±2,7	115±11 0,01	120±14,5 0,02	105±13 0,05	110±18 0,1	95±6,4 0,01	90±9 0,05	95±13 0,1	90±9 0,1		
Amylase activity (in units)	532±35	1300±225 0,02	1300±220 0,02	1650±420 0,05	1500±237 0,01	800±75 0,02	680±77 0,2	690±80 0,2	578±21,9 0,2		

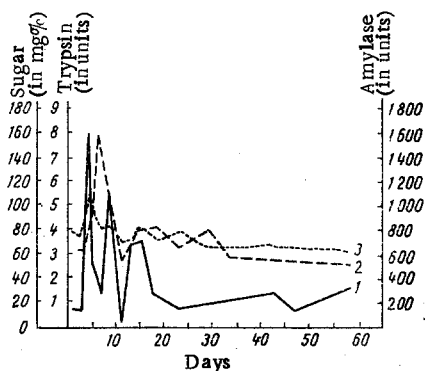


Fig. 1. Dynamics of indices of trypsin (1) and amylase (2) activity and sugar concentration (3) in blood of a dog after total pancreatectomy.

The activity of the enzymes and sugar concentration in the blood of totally pancreatectomized dogs are given in Table 2. During the first days after the operation the activity of the enzymes and the sugar concentration also rose sharply. This increase was maintained for 1-2 weeks. The values determined during the first days after the operation fluctuated considerably. As an illustration, the dynamics of these parameters in one of the dogs is shown in Fig. 1. In the first month after pancreatectomy the dog was given 4-6 units insulin daily, but during the second month no insulin was given.

After total or partial pancreatectomy all the biochemical parameters studied thus showed an increase on the first day after the operation, possibly on account of absorption of enzymes through the wound surface. However, the possibility cannot be ruled out that this increase reflects a reaction of the blood enzyme systems to the operation. The subsequent normalization of the trypsin and amylase levels indicates without fear of contradiction that the trypsin-like activity of the blood does not belong to pancreatic trypsin. Otherwise a sharp decrease in the activity of the enzyme would have been expected.

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