

BLOOD AMINO ACID COMPOSITION IN DOGS WITH DISTURBANCE
OF THE PANCREATIC EXOCRINE FUNCTION

E. V. Chernova

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Exacerbation of pancreatitis in dogs with a fistula of the pancreatic duct is accompanied by a decrease in the free amino acid level in the blood.

Dogs losing pancreatic juice over long periods of time develop hypo- or hyperproteinemia accompanied by marked sproteinemia [1, 3, 4, 9]. Changes in the total concentration and ratio between the various amino acids in the blood serum are also observed in patients with chronic pancreatitis [5].

The object of the present investigation was to study changes in the amino acid composition of the blood in dogs permanently losing pancreatic juice, both when the animals' condition was satisfactory and also during an exacerbation of the disease which, in its clinical and morphological picture, can be regarded as equivalent to chronic pancreatitis [2, 8].

EXPERIMENTAL METHOD

The level of free amino acids was investigated in whole blood [6] by linear descending chromatography on paper [7]. Experiments were carried out on nine intact dogs and six dogs with a Pavlov fistula of the pancreatic duct; four dogs were in a satisfactory condition (stable body weight and leukocyte count, normal appetite, absence of any marked spontaneous secretion), and two were investigated during exacerbation of the disease (impaired appetite, reduced body weight, increasing leukocytosis, fasting hypo- or hypersecretion).

EXPERIMENTAL RESULTS AND DISCUSSION

No significant difference could be found between the intact dogs and animals permanently losing pancreatic juice, but whose general condition remained satisfactory, in the blood levels of essential and unessential free amino acids (Table 1). During exacerbation of the disease, however, there was a significant decrease in the blood levels of all amino acids except cystine with cysteine. The deficiency of most amino acids was 35-50%, while in the case of glutamic acid and alanine it was 60%.

The results obtained with the dog Zhuchok, whose pancreatic fistula healed spontaneously, are interesting. In this dog, just as in the others, during the period of exacerbation of pancreatitis accompanied by continued loss of juice the levels of nearly all the free amino acids in the blood fell sharply. However, 1 month after the loss of juice had ceased, the concentrations of most amino acids were actually higher than before the operation (Table 2).

Preliminary determinations showed that the pancreatic juice contains unessential and essential free amino acids. The amino acid concentrations in the juice secreted spontaneously during exacerbation of the disease were higher than in the juice secreted after food. It can be postulated that during the hypersecretion which frequently develops during exacerbation of the disease, large quantities of amino acids are lost with the juice. However, their loss with the juice cannot be regarded as the principal or, still less, the only cause of the lowered blood levels of amino acids in these animals, for these changes were only found during

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TABLE 1. Blood Concentrations of Free Amino Acids in Intact Dogs and Dogs Permanently Losing Pancreatic Juice

Amino acids		Concn. of amino acids (in mg %), M±m			Significance of differences, P _{II-III}
		before operation, n = 19	during loss of juice		
			satisfactory, n = 19	illness, n = 9	
		I	II	III	
Essential	Lysine	1,18±0,06	1,17±0,07	0,51±0,003	<0,001
	Histidine	1,60±0,13	1,79±0,2	0,87±0,09	<0,001
	Arginine	1,83±0,19	1,50±0,12	0,90±0,018	<0,001
	Threonine	0,95±0,06	1,0±0,06	0,56±0,01	<0,001
	Methionine + valine	3,40±0,14	3,0±0,13	2,15±0,025	<0,001
	Phenylalanine	0,98±0,06	0,90±0,07	0,61±0,08	<0,001
	Leucine + isoleucine	1,15±0,09	1,06±0,07	0,68±0,025	<0,001
	Unessential	Cystine + cysteine	2,29±0,2	2,28±0,16	2,55±0,19
Aspartic acid		2,72±0,2	3,0±0,2	1,35±0,25	<0,001
Serine		0,93±0,09	0,88±0,08	0,54±0,007	<0,001
Glycine		0,70±0,15	0,76±0,08	0,45±0,03	<0,001
Glutamic acid		1,18±0,08	1,57±0,13	0,59±0,007	<0,001
Alanine		1,50±0,11	1,70±0,19	0,70±0,06	<0,001
Tyrosine		1,20±0,18	1,14±0,09	0,73±0,02	<0,001

TABLE 2. Blood Concentrations of Free Amino Acids in the Dog Zhuchok

Amino acids		Concentration of amino acids (in mg %), M ± m			Significance of differences	
		before operation, n = 9	during illness, n = 7	after loss of juice, n = 4	P _{I-II}	P _{II-III}
		I	II	III		
Essential	Lysine	1,17±0,07	0,55±0,05	1,40±0,16	<0,001	<0,001
	Histidine	1,27±0,07	0,73±0,06	1,72±0,18	<0,001	<0,001
	Arginine	1,53±0,22	0,87±0,07	1,45±0,15	<0,001	<0,001
	Threonine	1,24±0,1	0,58±0,06	1,58±0,1	<0,001	<0,001
	Methionine + valine	3,24±0,15	2,18±0,1	2,75±0,04	<0,001	<0,001
	Phenylalanine	0,83±0,05	0,50±0,05	1,00±0,08	<0,001	<0,001
	Leucine + isoleucine	1,0±0,15	0,65±0,06	1,20±0,06	<0,05	<0,001
Unessential	Cystine + cysteine	3,12±0,35	2,90±0,25	3,5±0,5	<0,5	<0,5
	Aspartic acid	2,36±0,29	1,0±0,13	1,80±0,3	<0,001	<0,02
	Serine	0,92±0,07	0,55±0,04	0,99±0,1	<0,001	<0,001
	Glycine	0,84±0,09	0,50±0,07	1,0±0,07	<0,001	<0,001
	Glutamic acid	1,46±0,09	0,60±0,04	2,0±0,06	<0,001	<0,001
	Alanine	1,35±0,09	0,62±0,05	1,70±0,08	<0,001	<0,001
	Tyrosine	1,27±0,06	0,77±0,06	1,04±0,08	<0,001	<0,02

exacerbations, despite the considerable losses of pancreatic juice at other times also. The mechanisms of the changes revealed by these experiments require further investigation.

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