

# HISTAMINE CONTENT OF BLOOD AND LYMPH AND THE ACTIVITIES OF HISTAMINASE AND CHOLINESTERASE DURING THE DEVELOPMENT OF EXPERIMENTAL INFLAMMATION

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According to many authorities [2, 3, 6], pathological states of various divisions of the nervous system, as well as in the course of some internal diseases, are accompanied by functional disturbances of the autonomic nervous system and the amount of their mediators present in the blood becomes elevated. This rise is regarded as an accumulation of an excess of neurohumoral factors at the site of their formation as a consequence of pathological irritation and the consequent migration of these substances into the blood stream.

A great deal is known concerning the histamine content of blood and tissues and the activities of the enzymes histaminase and cholinesterase.

However, very little is known about the activities of these enzymes in the lymph, even though the composition of the lymph reflects the events going on in the tissues of both the normal organism and also when its functioning has been upset.

The aim of the present study is to investigate the blood and lymph as to their content of histamine and the activities of histaminase and cholinesterase during the course of an experimental inflammation of the small intestine.

## EXPERIMENTAL METHODS

The experiments were performed on 88 cats of approximately the same age and weight. The animals had a laparotomy under aseptic conditions and turpentine in quantities of 0.1 cc was introduced into the wall of the small intestine and into the lumen in some 10-12 places.

As inflammations developed the animals were utilized in short experiments, a new animal being used each day from the group operated simultaneously.

In this fashion, we were able to trace the changes in the histamine-histaminase system and the cholinesterase activity during the inflammatory alterations taking place in the small intestine at the end of 3 hours, and then, 1, 2, 3, 5, 7 and 10 days after the time of injection of the turpentine. The cats were immobilized by infection of lycopodium into the carotid arteries. Blood for examination was drawn from the carotid artery, and lymph was drawn from the thoracic duct after a preliminary laparotomy. Histamine was determined by the biological method with a very slight modification of the method and instrument of V. M. Borovsky [4], histaminase activity - biological and chemical methods, cholinesterase activity - biological method [7].

Histamine Content, Activity of Histaminase and Cholinesterase in the Blood and Lymph of Cats after Injection of Turpentine (Average Values)

Time after introducing turpentine (in hours)	Clinical health of animals	Histamine content				Histaminase activity (γ histaminase destroyed by histamine)				Cholinesterase activity			
		in blood		in lymph		in blood		in lymph		in blood		in lymph	
		in %	deficit (+) in %	in %	deficit (+) in %	in %	deficit (+) in %	in %	deficit (+) in %	in %	deficit (+) in %	in %	deficit (+) in %
		normal animals	normal animals	normal animals	normal animals	normal animals	normal animals	normal animals	normal animals	normal animals	normal animals	normal animals	normal animals
3	...	1.31	+21	0.75	+27	1.19	+201	1.56	+164	0.39	+21	0.28	-14
12	...	1.59	+18	0.95	+16	3.58	+105	4.12	+99	0.31	-49	0.24	-43
24	...	1.55	+140	1.10	+27	2.44	-19	3.11	+85	0.20	-54	0.16	-43
48	...	3.14	+16	1.21	+82	2.30	-33	2.88	+111	0.18	-51	0.16	-50
72	...	3.30	+19	1.73	0	0.80	+113	1.73	+97	0.19	-8	0.14	-25
120	...	1.56	+2	0.75	-1%	2.54	+97	3.08	+135	0.36	-10	0.21	-1
168	...	1.34	+17	0.94	-20	3.34	+129	3.65	+118	0.35	+3%	0.27	+29
240	...	1.40		0.76		2.73		3.40		0.40		0.36	

## EXPERIMENTAL RESULTS

The average results obtained were compared with the base content of histamine, histaminase activity and cholinesterase of the same individual experimental animal (see Table). As this table shows, the histamine level rises in cats after turpentine has been introduced into the small intestine, its content in blood and lymph growing gradually to a maximum after 2-3 days, beginning to diminish after 5 days but not returning to normal, and by the 10th day the histamine content of the blood was higher than in lymph.

After introducing the turpentine into the small intestine the histaminase activity in the blood and lymph changed almost parallelly: within 3 hours there was observed a marked rise (in blood - 201%, in lymph - 164%), then a gradual decrease, and within 3 days the blood showed even a 33% decrease while the lymph had an insignificant increase of 11%. In the succeeding days there was again an increase (after 10 days, in blood - 129%, in lymph - 118%).

The cholinesterase activity in cats after the inception and development of inflammation decreased in both the blood and lymph in about the same proportion; being most marked after 2-3 days and least - after 7-10 days.

Histologic studies confirmed the presence of the inflammatory process in the small intestine; within 3 hours there were the signs of beginning inflammation, definite edema of the mucosa and submucosa, blood vessel engorgement; after a day marked edema of the submucosa, sloughing of the epithelium with surface villi and focal mucous necrosis; after 2 days - phlegmonous, submucous, and intramuscular sloughing with leucocytic dissolution. Later studies of the inflamed tissues showed a copious cellular infiltrate, presence of a fibrinous exudate, hemorrhages and necrotic foci in the intestinal wall.

The rise in histaminase activity within the blood and lymph within the first hours after introducing the inflammation-producing agent, in all probability, must be associated with the beginning of the active hyperemia, while later (by the 2d-3d days) the histaminase activity may be the consequence of dystrophic processes proceeding in the tissues and leading to the formation within them of histaminase, this latter being then destroyed.

The rise of the histamine level within the blood and lymph can be explained by the formation or liberation of large amounts of histamine as well as of the depression of histaminase activity.

Depression of the cholinesterase may be a consequence of the rise of the histamine, as it is well known that histamine has a strong anticholinesterase activity [1, 5].

#### SUMMARY

Experimental inflammation in cats raised the histamine level of blood and lymph. The histaminase activity rises simultaneously while that of cholinesterase was depressed.

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\* In Russian.