

# DISTURBANCES OF SMALL INTESTINE FUNCTION IN DOGS WITH EXPERIMENTAL PNEUMONIA

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Disturbances of enzyme secretion, absorption, and motor activity of the small intestine in dogs with experimental pneumonia are described.

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The digestive tract is an integrated system closely connected with various organs. The state of the small intestine in pneumonias has been inadequately studied.

This paper describes the results of an investigation of the enzyme-secretory, absorptive, and motor functions of the intestine in dogs with experimental pneumonia.

## EXPERIMENTAL METHOD

Chronic experiments were performed on 14 dogs with multiple fistulas. The intestinal juice was collected from an isolated loop of small intestine when secreted in response to mechanical stimulation. Enterokinase and alkaline phosphatase in the juice and stools were determined by methods elaborated in G. K. Shlygin's laboratory [3, 4]. The intensity of absorption of glucose in the intestine was determined by titration [1]. The motor activity of the intestine was recorded by a balloon-and-graphic method.

Pneumonia was induced by injecting a virulent culture of type IV pneumococcus into the lungs after preliminary sensitization and general cooling of the animal. The presence of the disease was confirmed by clinical, hematological, pathological, and, in some cases, histological and roentgenological investigations.

## EXPERIMENTAL RESULTS

The study of intestinal secretion in pneumonia revealed fluctuations in the secretion of juice on various days of the experiments, with a marked tendency for it to diminish.

Changes also occurred in the qualitative composition of the juice. Secretion of the enzymes of the juice tended to fall stepwise, and on some days on the experiments it disappeared completely. In control experiments on the dog Dunai, for example, the enterokinase content varied from 113-150 units and the alkaline phosphatase from 3370-4220 units. In the dogs with pneumonia the range of variations of enterokinase was from 0-454 units, and of alkaline phosphatase from 0-7590 units.

The content of enzymes in the stools also showed changes. As a rule the excretion of enzymes with the stools was increased in the dogs with pneumonia. The increase in the enzyme content in the stools may be explained as follows. First, in pneumonia the motor activity of the intestine is often stimulated, its contents are evacuated rapidly, and the enzymes are not completely destroyed. Second, in this disease the enzymes are probably inadequately utilized in the intestine. Finally, the possibility is not ruled out that in pneumonia the bacterial flora of the intestine is modified, influencing the process of enzyme inactivation. Our results are in agreement with those of other investigations [2] confirming the importance of the microflora of the large intestine in the inactivation of some intestinal enzymes.

It was discovered in the course of the investigation that the absorptive activity of the small intestine also was substantially modified. Differences in the level of absorption on different days of the control experiments did not exceed 1-8%. In the dogs with pneumonia the glucose absorption usually remained within the limits of the control values for the first 2-3 days of the disease, but thereafter absorption was sometimes normal, sometimes depressed, and fluctuations of this type persisted after clinical recovery. If the

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mean data for the intensity of absorption in the dog Tsygan' before and during the disease were compared, its depression was clearly apparent. It fell from 72% before the disease to 52% during its course. Similar data were obtained for the other dogs.

A study of the motor activity of the intestine revealed a decrease in their strength, and also in their number, which fell to 5-11 in the dog Pamir (from a normal value of 15-18), to 4-9.5 in dog Orel (normally 16-18), and so on. The periodicity of the contractions also changed. In some experiments on the dog Orel the resting period was lengthened to 24-37 min (normally 7-14), while in others it was shortened, the period of contractions meanwhile being lengthened.

Hence, in dogs with pneumonia, all the principal functions of the small intestine are disturbed. The most prolonged and persistent disorders affect the enzyme secretory activity, the more transient the motor activity.

#### LITERATURE CITED

1. Yu. L. Kuz'mina and V. V. Dyudyaev, In the book: Collected Scientific Transactions of Ivanovo Medical Institute [in Russian], No. 12, Ivanovo (1957), p. 478.
2. S. Ya. Mikhlin, In the book: Proceedings of a Scientific Conference on the Problem: Physiology and Pathology of Cortico-Visceral Relationships and Functional Systems of the Organism [in Russian], Vol. 2, Ivanovo (1965), p. 56.
3. L. S. Fomina, S. Ya. Mikhlin, and G. K. Shlygin, Biokhimiya, No. 2, 134 (1952).
4. G. K. Shlygin, Biokhimiya, No. 6, 509 (1950).