HISTAMINE CONCENTRATION IN THE GASTROINTESTINAL TRACT BEFORE AND AFTER RESECTION OF THE PROXIMAL PORTION OF THE LARGE INTESTINE IN RATS

T. V. Volkova and P. L. Zel'tser

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The range of fluctuations in the histamine concentration in various parts of the gastrointestinal tract was determined in hungry and satisfied rats. The results show that the histamine level under normal conditions depends on the state of function of the digestive tract. After resection of the large intestine the differences between the histamine concentrations in the hungry and satisfied rats disappeared, indicating disturbance of adaptive and trophic processes in the walls of the digestive tract.

Details of the serotonin and secretin concentrations in the digestive tract after operative exclusion of the stomach [1, 2] or division of the small intestine [3] are given in the literature.

Having regard to the importance of histamine in the physiological mechanisms of regulation of the digestive system, it was decided to study the effect of resection of the proximal portion of the large intestine

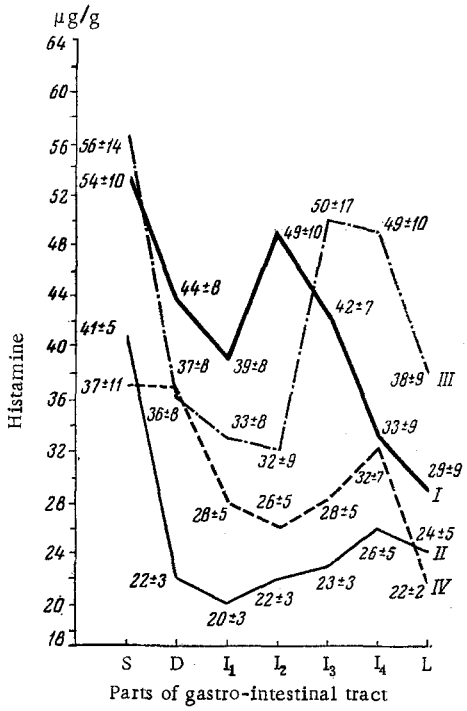

Fig. 1. Distribution of histamine content in tissues of gastro-intestinal tract of "hungry" and "satisfied" rats. Abscissa: portions of alimentary tract (S, stomach; D, duodenum; I_1, I_2, I_3, I_4, various parts of the small intestine; L, proximal part of large intestine); ordinate: histamine concentration (in μg/g). I) "Hungry" controls; II) "satisfied" controls; III) "hungry" colectomized; IV) "satisfied" colectomized rats. Values of M±m shown.

Laboratory of the Physiology and Pathology of Digestion, Institute of Normal and Pathological Physiology, Academy of Medical Sciences of the USSR, Moscow. (Presented by Academician of the Academy of Medical Sciences of the USSR, A. M. Chernukh.) Translated from Byulleten' Éksperimental'noi Biologii i Meditsiny, Vol. 76, No. 10, pp. 46-47, October, 1973. Original article submitted August 2, 1972.

on the histamine concentration in the tissues of various parts of the gastrointestinal tract.

EXPERIMENTAL METHOD

Experiments were carried out on 30 male rats weighing 250-300 g. The large intestine was resected in 12 of these animals.

Histamine was determined fluorimetrically in the control and experimental (1 month after resection) rats in specimens containing all the layers of the wall of the stomach, duodenum, four parts of the small intestine, and the proximal portion of the large intestine. The control and experimental rats were divided into two groups: the animals of group 1 received only water 2 days before the experiment (hungry rats), while the animals of group 2 were kept on an ordinary diet (satisfied rats).

EXPERIMENTAL RESULTS

The concentration and distribution of histamine in the tissues of different parts of the gastrointestinal tract of the control animals depended on the state of function of the digestive tract (Fig. 1). For instance, in hungry rats the mean histamine concentration in all parts of the gastrointestinal tract investigated was higher than in the satisfied animals. The curve of histamine distribution in the hungry rats fell in the direction from the stomach to the large intestine with a small rise, not statistically significant ($P > 0.05$), in certain parts of the small intestine.

In the satisfied rats the histamine concentration fell to a minimum in the proximal portion of the small intestine.

One month after resection of the proximal portion of the large intestine the histamine concentration in the duodenum and in the proximal portion of the small intestine of the hungry rats showed only a tendency to decrease ($P > 0.05$) compared with its level in the hungry control rats. In the middle and, in particular, the distal portion of the small intestine there was a statistically significant increase in the histamine concentration.

In the satisfied rats undergoing the operation the histamine concentration in all parts except in the large intestine was only slightly higher than in the satisfied controls.

These investigations thus enabled the range of fluctuations in the histamine concentration in different parts of the gastrointestinal tract of intact rats in a hungry and satisfied state to be determined. The results show that the histamine concentration depends on the state of function of the digestive tract.

After resection of the large intestine the differences in the histamine concentration in the hungry and satisfied rats disappeared (the curves came closer together), possibly indicating a disturbance of adaptive and trophic processes in the walls of the digestive tract.

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