

PROTEIN CONTENT IN VARIOUS ZONES OF THE GASTRIC MUCOSA

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UDC 612.325.015.348

The protein content in the mucous membrane in different zones of the stomach (greater and lesser curvatures, cardia, pylorus) was investigated. The protein content in the mucous membrane of the greater and lesser curvatures and cardia was found to be much higher than that of the pylorus. The differences affect both globulins and albumins. The pyloric mucous membrane also possesses weak proteolytic activity.

The mucous membrane of different zones of the stomach possesses different morphological and physiological properties [1-5, 9, 10]. These zones also differ significantly in the activity of certain enzymes [8, 11], and in the content of nucleic acids [14], total protein and lipids [12], and electrolytes [13, 15].

The object of this investigation was to study the content of various proteins and the proteolytic activity in the mucous membrane of different zones of the stomach.

EXPERIMENTAL METHOD AND RESULTS

Experiments were carried out under acute conditions on 15 dogs 18-20 h after feeding. The animals were anesthetized with morphine and nembutal. The dog's gastric mucosa was in a resting state: its reaction was neutral or alkaline. Areas of mucous membrane were detached from the greater and lesser curvatures, the cardia, and the pylorus. The subsequent treatment of the mucous membrane was as described in [7], and proteins were determined in the tissue homogenate by the method of diffuse salting out. The proteolytic activity in a homogenate of mucous membrane, acidified to pH 1.5-2.0, was determined by Anson's method as modified in the writer's laboratory and expressed in mg pepsin per gram tissue.

The experiments showed that the mucous membrane of the greater curvature of the stomach had the highest protein content; it was a little lower in the mucous membrane of the lesser curvature and cardia, and lowest of all in the pyloric part of the mucous membrane (Fig. 1). No qualitative differences were found between the protein composition in the mucous membrane of the greater or lesser curvature and cardia. The quantitative differences were only slight. The protein composition of the mucous membrane of the pyloric part of the stomach differed significantly. The protein content in the pyloric mucosa was almost 50% less than in the mucosa of the greater curvature (Fig. 1). Analysis of these results showed that the most substantial difference in the protein content affected the globulin-like proteins, i.e., the zone in which pepsin is salted out. A difference also was found in the zone of the albumin-like proteins. Investigations of the proteolytic activity of homogenates of the mucous membrane showed that this is very low in the pyloric part. The highest proteolytic activity was observed in the mucous membrane of the greater curvature of the stomach (Fig. 1).

Laboratory of Regulation of Digestion, A. A. Bogomolets Institute of Physiology, Academy of Sciences of the Ukrainian SSR, Kiev. (Presented by Academician of the Academy of Medical Sciences of the USSR N. N. Sirotnin.) Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 73, No. 1, pp. 49-50, January, 1972. Original article submitted March 3, 1971.

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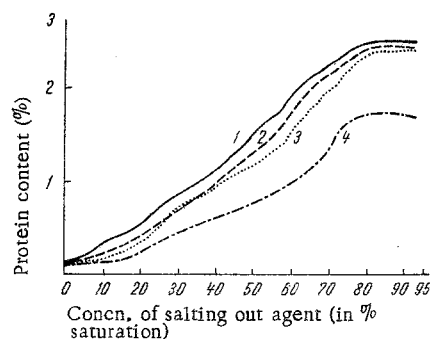


Fig. 1. Protein content in different zones of the gastric mucosa. (Protein content expressed as percentage of weight of fresh tissue; mean results for 15 experiments given.) 1) Greater curvature (total protein content $2.65 \pm 0.17\%$, proteolytic activity 3.8 ± 0.63 mg pepsin); 2) lesser curvature (total protein content $2.03 \pm 0.11\%$, proteolytic activity 3.99 ± 0.65 mg pepsin); 3) cardia (total protein content $2.39 \pm 0.15\%$, proteolytic activity 2.23 ± 0.55 mg pepsin); 4) pyloric part (total protein content $1.37 \pm 0.13\%$, proteolytic activity 0.6 ± 0.27 mg pepsin).

Different zones of the gastric mucosa thus differ in their protein content. The protein content is higher in that part of the gastric mucosa which secretes gastric juice (greater and lesser curvatures and cardia). The mucosa of the pyloric part of the stomach, which produces mainly a mucous secretion, has a protein content lower by almost half. The differences in protein composition of the mucous membrane in different zones of the stomach affect both the globulin-like and albumin-like proteins. Considerable variations are found in the protein composition in different animals. The reason why the protein content is higher in the mucous membrane of the greater and lesser curvatures and the cardia is probably that the chief cells which produce pepsin, accumulating as granules, are located there.

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