

## MORPHOLOGY OF IMMUNE STRUCTURES OF THE DUODENUM OF SOME MAMMALS AND THEIR CONNECTIONS WITH ITS CAVITY



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### АЙРИМ СУТ ЭМИЗУВЧИЛАР ЎН ИККИ БАРМОҚ ИЧАК ИММУН ТУЗИЛМАЛАРИНИНГ МОРФОЛОГИЯСИ ВА УЛАРНИНГ ИЧАК БЎШЛИГИ БИЛАН АЛОҚАСИ

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### МОРФОЛОГИЯ ИММУННЫХ СТРУКТУР ДВЕНАДЦАТИПЕРСТНОЙ КИШКИ НЕКОТОРЫХ МЛЕКОПИТАЮЩИХ И ИХ СВЯЗИ С ЕЕ ПОЛОСТЬЮ

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**Резюме.** Қуёнлар ва денгиз чўчқалари ўникки бармоқли ичаги иммун тузилмалари морфологияси ўрганилди. Уларнинг умумий тузилиши тамойиллари аниқланишига қарамай, улар орасидаги морфологик фарқлар аниқланди. Лимфатик тузилмаларни ичак бўшлиғи, яқка-яқка лимфатик тугунчалар ва уларнинг тўпламлари билан боғлаб турадиган эпителиал каналча аниқланди.

**Калит сўзлар.** Ўникки бармоқли ичак, иммун тузилмалар морфологияси.

**Abstract.** The morphology of immune structures of the duodenal wall in rabbits and guinea pigs was studied. The presence of morphological differences between them was established, although the general principle of their structure is identical. An epithelial canal connecting lymphatic formations with the intestinal cavity of single lymphatic nodules and their clusters was discovered.

**Key words:** Duodenum, morphology of immune structures.

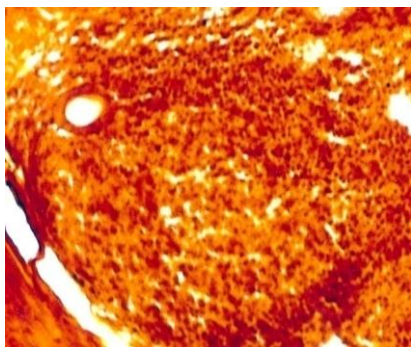
**Introduction.** Changes in the conditions of existence and the nature of nutrition of mammals lead to adaptive-morphological changes in their digestive tract and its immune structures, although the general patterns of their structural organization are identical [3]. There are works devoted to the study of the immune structures of the small intestine in the norm [5,7], in the experiment [1,8], and also under the influence of certain factors [4,6,9]. Although there are numerous parallelisms in the structure of immune structures, however, in each class of vertebrates the complication of this organization is achieved independently [2]. The small intestine is an important part of the digestive tract, where the final chemical processing of chyme and absorption of nutrients into the body occur. However, the study of the morphology of the immune structures of the wall of the duodenum (the initial part of the small intestine) and the morphological basis of their connection with its cavity is an insufficiently studied issue.

**Objective of the study.** To study the morphology of immune structures of the duodenal wall of rabbits, guinea pigs and their connections with its cavity.

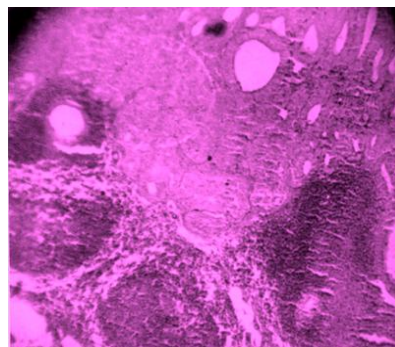
**Material and methods of study.** The material for our studies was the duodenum of 10 rabbits and 6 guinea pigs, which was taken immediately after slaughtering the animals under sodium ethanol anesthesia, strictly observing the rules of bioethics. The material was fixed in 12% neutral formalin. Histological processing of the material

and embedding in paraffin were carried out according to the generally accepted technique. Serial paraffin sections were stained using the hematoxylin-eosin method and impregnated with silver nitrate according to Grimelius. With the latter method, the morphology of the lymph nodes is most clearly identified. Viewing of the preparations and photography were carried out on a Leica microscope, systems GmbH Wetzlar (Portugal).

**Results of the study.** The immune structures of the duodenum of the animals studied by us are represented by singly located lymphatic nodules, clusters of lymphatic nodules and diffusely located interstitial lymphocytes. In rabbits, the immune structures of the duodenum are also represented by diffusely located interstitial lymphocytes and singly located lymphatic nodules, and aggregation (accumulation) of these nodules is rarely found. Diffusely located lymphocytes populate the submucosa and proper plate of the mucous membrane. In other membranes, they are found in the connective tissue around blood vessels and in the connective tissue layer between other tissue structures. The density of interstitial lymphocytes tends to increase towards the intestinal lumen. Their highest density is noted around the crypts and in the intestinal villi. Often, individual lymphocytes can be found in the epithelium of the mucous membrane. They are usually hyperchromic and are located at different distances from the basement membrane, sometimes near the surface of the epithelium.



A



B

**Fig. 1.** Lymphatic nodules and cross-sections of epithelial tubules (arrows). A. A solitary lymphatic nodule of the small intestine of a rabbit and a cross-section of an epithelial tubule. Grimelius impregnation. Lens 20, approx. 12K. B. A section of a group of lymphatic follicles of the wall of the duodenum of a guinea pig and a cross-section of epithelial tubules. Hematoxylin and eosin, Lens 20, approx. 12K

In very rare cases, we were able to detect single lymphocytes in the lumen of the crypts, near their epithelium. Single lymph nodes are located mainly in the proper plate of the mucous membrane. This part of the mucous membrane protrudes into the lumen of the intestine. In all cases, there is a deep groove around the protrusion, which is covered with intestinal epithelium. The bottom of the groove reaches the muscular plate. Sometimes crypts are formed from the bottom of the groove, which reach the muscular plate and, in its absence, the muscular membrane. In guinea pigs, the immune structures of the small intestine are also represented by diffusely located intratissue lymphocytes, singly located and group clusters of lymph nodes. These clusters contain several lymph nodes. The largest clusters of lymph nodes by size and number of nodes in them are found in the duodenum in the area of its large papilla. At the location of these clusters, there is no muscular plate of the mucous membrane, and the submucosa of the intestine merges with the proper plate of the mucous membrane. These clusters consist of closely located nodes, between which there are small distances dotted with lymphocytes. Cross sections of crypts are found around the nodes. Often the bottom of the crypts reaches the muscular membrane of the intestinal wall. The number of crypts around the nodes is different, and on planar sections their cross sections surround the lymph node. The size and morphology of the lymph nodes of the clusters are identical to singly located lymph nodes. They have a well-defined germinal center. We found a section of epithelial tubules that apparently connect the intestinal lumen with a single lymph node or clusters of them (Fig. 1).

In one case, we were able to detect a longitudinal section of this canal from its beginning to the lumen of the intestine. The epithelial canal differs from the environment of the intestinal crypts by a relatively larger diameter. The epithelium covering the canal differs from the epithelium of the crypts and villi by a relatively smaller height of epithelial cells and the absence of goblet cells in the epithelium. Thus, in the immune structures of the duodenum, a cross-section of a tubule lined with epithelium is sometimes found, which differs in morphology from the intestinal epithelium.

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### **МОРФОЛОГИЯ ИММУННЫХ СТРУКТУР ДВЕНАДЦАТИПЕРСТНОЙ КИШКИ НЕКОТОРЫХ МЛЕКОПИТАЮЩИХ И ИХ СВЯЗИ С ЕЕ ПОЛОСТЬЮ**

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**Резюме.** Изучена морфология иммунных структур стенки двенадцатиперстной кишки у кроликов и морских свинок. Установлено наличие морфологических различий между ними, хотя общий принцип строения их идентичен. Обнаружен эпителиальный канал, связывающий лимфатические образования с полостью кишки и одиночными лимфатическими узелками и их скоплениями.

**Ключевые слова.** Двенадцатиперстная кишка, морфология иммунных структур.