



RESTORATION OF MORPHOLOGICAL STRUCTURES IN THE WALL OF THE SMALL INTESTINE

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ABSTRACT

This article provides information on the restoration of morphological structures in the wall of the small intestine, atrophic processes in the muscular layer of the intestine, pathology of the digestive tract. In addition, there are enough points about the harmful factors affecting the functioning of the small intestine, as well as the fight against it and its prevention.

Changes in the mucous membrane were revealed, manifested by an increase in the reduction of villi, a decrease in the depth of the crypts, a predominance of goblet cells, and an increase in cellular infiltration. Proliferation of connective tissue in the perivascular area and submucous membrane, and atrophic processes in the muscular layer were detected. Currently, the proportion of diseases caused by environmental factors has increased. It is known that with the chronic action of hydrogen sulfide-containing gas in the body, pathology of a number of organs and systems occurs; one of the significant places is occupied by the pathology of the digestive tract, through which a certain amount of toxic substances enters the body.

Constant contact with harmful factors undoubtedly leads to chronic poisoning of the body; endogenous intoxication develops, manifested by biochemical changes and changes in microcirculation in the target organ, in particular in the gastrointestinal tract. Due to hypoxia and poor circulation, mucin biosynthesis is suppressed, and the mucosal epithelium is damaged by enzymes. The intestinal wall loses its barrier properties. Bacteria and toxins enter the bloodstream and the free abdominal cavity. As a result, intoxication increases and the normal processes of digestion and absorption are disrupted. Based on the above, the purpose of our study was to study the structures in the wall of the small intestine under chronic exposure to hydrogen sulfide-containing gas in a concentration not exceeding the maximum permissible.

The experimental group was exposed to gas at a hydrogen sulfide concentration of 3 mg/m³ four hours a day, five days a week, for four months. The first removal of animals from the experiment was carried out a month from the start of the experiment, and thereafter - once a month. To assess the reserve possibilities for restoration in the structures of the small intestine, a study was conducted based on the results of the fifth month, during which no inhalations were carried out.



Histological paraffin sections were stained with hematoxylin-eosin, Van Gieson and hematoxylin-basic fuchsin-picric acid (HAFP). The morphometric study was carried out in accordance with the principles of systematic quantitative analysis. One month after the start of chronic inhalation of hydrogen sulfide gas, when stained with hematoxylin and eosin, moderate swelling of the mucous, submucosal layers and connective tissue layer of the muscular layer was noted. There was a slight flattening of the villi with an increased content of goblet cells compared to the control group, as well as a decrease in crypt depth. Enterocytes did not fill the entire surface of the intestinal villi: partial desquamation was noted at the apex. Moderate cellular infiltration was observed in the lamina propria and submucosal layer. A slight hyperplasia of the small intestine's own lymphoid apparatus in the submucosal layer was revealed.

In the muscle layer there was slight degeneration, swelling of the fibers and intermuscular connective tissue space with signs of slight cellular infiltration. In some areas of the muscular lining of the intestinal wall, staining of the cytoplasm of muscle cells using the GOPP method was heterogeneous. The tinctorial properties of the intestinal wall membranes by the end of the first month of chronic intoxication when stained with the Van Gieson method remained practically unchanged. A study of preparations of the small intestine of the second month of chronic exposure to hydrogen sulfide gas showed a decrease in the height of the villi and the depth of the crypts. An increase in the number of goblet cells was noted, along with this, desquamation of the villous epithelium was detected not only at the apexes, but also in the upper third.

In the intestinal lumen there is an accumulation of a homogeneous substance infiltrated by cells. In the mucous membrane, especially at the border with the submucosa, where the choroid plexuses are located, focal accumulations of cells resembling lymphoid follicles were observed. Hyperplasia of the lymphoid apparatus of the small intestine was detected. Progressive changes were noted in the muscular lining of the small intestine. Dystrophy of the muscularis layers and areas of true fiber disintegration were revealed. In preparations stained with GOPP, heterogeneity of the muscular lining of the intestinal wall and intense cellular infiltration were noted.

Myocytes were uncoupled by cells involved in inflammation and due to swelling of the intermuscular space. Changes in the preparations stained according to Van Gieson were manifested by the appearance of weak fuchsinophilia of the lamina propria of the mucous membrane and submucosa. Picrinophilia of the muscularis mucosa was disturbed by areas of fuchsinophilia, especially at the border with the submucosa and at the level of the intermuscular connective tissue septum, which gave it a heterogeneous color. The sites of collagen deposition were homogeneous. Three months from the start of the experiment, morphological signs of disruption of the integrity of the mucous membrane of the small intestine increased.

Most of the villi are significantly reduced. The lumens are expanded due to a decrease in the thickness and number of villi and are obstructed by cell masses and mucus. The epithelium is infiltrated by cells of the lymphoid series, the border with the lamina propria is discontinuous or completely disappears against the background of cells migrating from the lamina propria. The muscularis propria and the lamina propria exhibited similar tinctorial properties.



Basophilic areas appeared against the background of pale eosinophilic staining. Smooth myocytes lost their correct direction, which was reflected in the disordered arrangement of their nuclei. The thickness of the muscle membrane decreased significantly compared to the previous period of the chronic experiment; swelling of the intermuscular connective tissue and massive cellular infiltration were noted. Thickening of the serous membrane was noted. In preparations stained according to Van Gieson, an increase in signs of collagen formation was noted. The muscular lining of the small intestine demonstrated its fuchsinophilia, and collagen deposits in it were of a fascicular nature.

Destructive processes in the small intestine that developed during the experiment indicated a chronic, sluggish process and the irreversibility of the changes that occurred. To study the reserve possibilities of restoring morphological structures in the wall of the small intestine of laboratory animals, it was planned to study them a month after the end of exposure to natural gas at a hydrogen sulfide concentration of 3 mg/m³. In preparations stained with hematoxylin and eosin, minor changes occurred relative to the previous month of the experiment. A positive aspect was the restoration of the boundaries of the epithelium with the lamina propria. It became clearer, smoother and more continuous. A decrease in the number of goblet cells and villous destruction processes was also detected.

The remaining parameters indicated ongoing collagen formation in the structures of the wall of the small intestine (lamina propria, submucosa and intermuscular connective tissue).

Surgical interventions on the gallbladder in rabbits lead to reactive changes in the small intestine that occur in a logical connection with the dynamics of the inflammatory process. The administration of Roncoleukin activates lymphocytes of the small intestine, which can help relieve inflammation and speed up recovery after surgery.

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