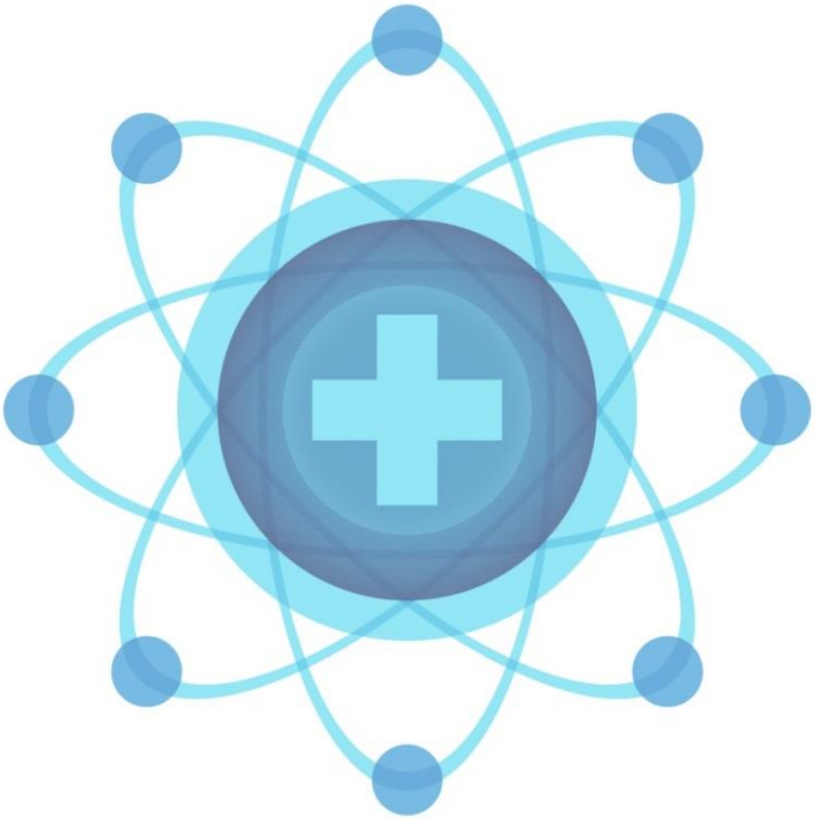

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Morphological and morphometric research of the fundus of the stomach under various influences and the study of the mechanism of adaptation

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To establish the mechanisms of adaptation to various effects, the fundic gland of the stomach was studied morphologically and morphometrically under short - term and long-term exposure to ammonium chloride.

The purpose of this research. Establishment of mechanisms of adaptation to various influences on the basis of morphological and morphometric study of the fundic gland of the stomach during short - term and long-term exposure to ammonium chloride.

Material and Methods: According to the purpose of the study, ammonium chloride was administered subcutaneously 1 time - 0.1 mg/kg in animals weighing 120 - 140 g. Slaughter was carried out 1, 4, 10 and 25 days after the administration of the drug. For microscopy, pieces of the stomach wall of the fundus were taken . Fixation of the tissue of the fundus of the stomach was carried out in a 1% solution of $O_S O_4$ araldite . Fixation lasted 1.5 hours. After appropriate wiring, they are embedded in paraffin. Ultrathin sections were obtained on an LKB ultramicrotome . After contrasting, they were viewed under a JEM 100 S electron microscope .

The results of our own research: A day after the introduction of ammonium chloride, the structure and secretory activity of the superficial pit epithelium of the stomach in comparison with their state in intact animals has no differences. Minor changes are found in parietal cells: the proportion of active and moderately active increases to 30-35% with a corresponding decrease in hypofunctional (25%) and resting (9-10%). In the first two types of cells, along with an increase in tubulo-vesicular structures near the intracellular tubules and the apical plasmolemma, the number and length of microvilli and the lumen of the tubules increase. The folding of the lateral and basal plasma membranes only tends to increase. Oval or round mitochondria have a high electron density and a large number of cristae . The fraction of active nuclei slightly increases. The structure and function of the main cells a day after the start of the introduction of NH_4Cl is still characterized by pronounced heterophasity . If in some cells the RER cisterns are expanded, the Golgi complex occupies a significant volume, zymogen granules of medium electron density are found in the supranuclear cytoplasm, the structures of the complex synthesized in the expanded RER cavities, then in other main cells the RER cisterns are flattened, the structures of the Golgi complex are moderately active, secretory granules relatively more. No visible structural changes were found in endocrine cells.

In case of one-day acidosis, the determination of the content of pepsin in gastric juice revealed its significant decrease in comparison with the control: from 19.72 ± 1.34 to 13.99 ± 1.16 ($P < 0.05$); pH decreased from 5.22±0.24 to 3.52±0.2 ($P<0.001$). With metabolic acidosis, which develops by day 3, there is a tendency to increase functionally active parietal cells. They, as described earlier, are characterized by an increase in tubulo- vesicular structures and mitochondria in the cytoplasm, intracellular tubules with an enlarged lumen, microvilli protruding into the lumen of

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the excretory ducts. On the surface and apical zone of the superficial pit epithelium, a PAS-positive mucous product increases. In additional cells, mucin-containing secretory granules also increase.

If under physiological conditions (in intact animals) the chief cells are in different phases of the secretory cycle, then acidosis causes synchronization of their activity within 3 days. In the body and at the bottom of the fundic glands, they are in the phase of maximum accumulation of zymogen granules in the supranuclear zone. The cisterns of the Golgi complex are collapsed, there are almost no vesicles, and a moderate number of vacuoles. The SER profiles are closely adjacent to each other, their short flat cisterns are found under the core and to the side of it. The proportion of heterochromatin in the nucleus predominates over euchromatin . Endocrine cells, depending on the type, may be heterogeneous in the content of secretory granules. In the composition of gastric juice, the content of pepsin and pH decreased even more: 6.31±0.44 units /ml; 3.03±0.3, respectively.

With compensated metabolic acidosis, as noted earlier, on days 6 and 10 of the experiment, PAS-positive material becomes more intense both on the surface and in the apical cytoplasm of the pit-surface epithelium. Parietal cells are synchronized and are in a state of the highest functional activity. The diameter of intracellular tubules is maximally increased; microvilli in their lumen and on the apical surface of cells are numerous and long. Some of the dilated intracellular tubules continue into the lumen of the fundic gland. Mitochondria are mostly round, of moderate density with a dense arrangement of cristae. The number of smooth-walled vesicles in the cytoplasm is sharply reduced. Karyolemmaneric, the perinuclear space is enlarged, the heterochromatin is significantly reduced, the nucleolus is displaced towards the nuclear pores.

In the considered terms of the study in the main cells of moderately electron-dense secretory granules in the supranuclear cytoplasm, there are even more. As a result, the nucleus is located near the basal plasmalemma of the cell. Between the secretory granules and around the nucleus, the SER profiles form flat cisterns; the Golgi complex has single vacuoles, vesicles and flattened cisterns, is hypoplastic .

For a long time, 20-30 days, the introduction of ammonium chloride causes changes in acid-base balance diagnosed as sub compensated metabolic acidosis. During these periods of experiments, structural and functional rearrangements in the fundic part of the stomach are almost identical. The pits become less deep than in intact animals. The pit-superficial epithelium and its surface contain a significant amount of PAS-positive material. A narrow crimson strip is revealed and in the lumen fundic glands, to the zone of transition into the body.

Parietal cells become expressed heterogeneous: about 40 - in the state of synthesis of the secretory product; 30% - its accumulation, 20% - active secretion and 10% - relative functional rest. In functionally active parietal cells, the intracellular tubules are maximally expanded, often communicating with the lumen of the glandular tubules. In the excretory ducts and on the apical surface of the parietal cells, the microvilli are elongated. In the basal part of the cell, the folding of the plasmalemma is increased; secretory smooth-walled vesicles in the cytoplasm are

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single. Mitochondria are numerous, round, with a moderately dense matrix and a number of cristae . Together with them, in the same glandular tubule in the fundic part of the stomach, parietal cells with numerous vesicles, expanding intracellular tubules, are determined. Mitochondria are numerous, with an electron- dense matrix and a large number of cristae ; nuclei are rich in euchromatin . By the 30th day of sub compensated metabolic acidosis , while maintaining the overall topography of the main, parietal and endocrine cells, the number of endocrine cells significantly increases.

The pH of gastric juice by the end of the experiment decreases to 2.28±0.16 (PH<0.001). The pepsin content rises to 18.4±0.6, i.e. almost reaches its value in normal animals.

Thus, in the dynamics of metabolic acidosis caused by the introduction of ammonium chloride, along with the activation of parietal cells, interconnected and interdependent rearrangements of the structure and function of the integumentary pit epithelium, main and endocrine, are observed. With the genetic determinism of the adaptive response to metabolic acidosis in the fundic part of the stomach, its mechanisms are complex and require even more in-depth study.