

## ENDOCRINE CONTROL OF THE DIGESTION PROCESS. GASTROINTESTINAL ENDOCRINE CELLS

**Victoria Vladimirovna Sarkisova**

Assistant of Samarkand State Medical University

**Regina Olegovna Xegay**

**Amina Aslamovna Numonova**

Students of Samarkand State Medical University

<https://doi.org/10.5281/zenodo.7423794>

**Abstract.** Digestion is a complex process in which food is subjected to chemical and mechanical processing, with the formation of simpler molecules, which are then absorbed into the walls of the digestive tube. Coordination of all these processes occurs through nervous and humoral regulatory mechanisms. The role of the central nervous system in the regulation of digestion decreases with distance from the oral cavity. In the future, regulation is already carried out by the humoral mechanism. Humoral factors include extractive substances present in food, as well as gastrointestinal hormones (or enterins), which are produced by glands located directly in the gastrointestinal wall. These glands differ in their structure depending on their location in different parts of the gastrointestinal tract.

**Keywords:** APUD system, gastrointestinal hormones, intestinal lumen, enteroendocrine cells, glandulocytes.

## ЭНДОКРИННАЯ РЕГУЛЯЦИЯ ПРОЦЕССА ПИЩЕВАРЕНИЯ. ЖЕЛУДОЧНО-КИШЕЧНЫЕ ЭНДОКРИННЫЕ КЛЕТКИ

**Аннотация.** Пищеварение — сложный процесс, при котором пища подвергается химической и механической обработке, с образованием более простых молекул, которые затем всасываются в стенки пищеварительной трубки. Координация всех этих процессов происходит через нервные и гуморальные регуляторные механизмы. Роль центральной нервной системы в регуляции пищеварения снижается по мере удаления от полости рта. В дальнейшем регуляция осуществляется уже по гуморальному механизму. К гуморальным факторам относятся экстрактивные вещества, содержащиеся в пище, а также желудочно-кишечные гормоны (или энтерины), которые вырабатываются железами, расположенными непосредственно в стенке желудочно-кишечного тракта. Эти железы различаются по своему строению в зависимости от их расположения в разных отделах желудочно-кишечного тракта.

**Ключевые слова:** система APUD, гастроинтестинальные гормоны, просвет кишечника, энтероэндокринные клетки, glandулоциты.

### Relevance

On May 13, 2020, a real breakthrough occurred in the study of hormonal regulation of digestive processes. A group of scientists from the Habrecht Institute and Utrecht University in the Netherlands have compiled an atlas of human intestinal hormones for the first time. According to scientists, this can create completely new methods in the treatment of diabetes and obesity. The journal Cell has published the results of scientists' research.

Stimulation of intestinal muscle motility, restoration of the superficial cellular layer of the intestine, creating a feeling of hunger and satiety - all these tasks are performed by numerous

enteroendocrine cells scattered throughout the gastrointestinal tract. These cells react to components contained in food or to various bacteria also found in the gastrointestinal tract.

The difficulty in studying these cells is created because of their uniqueness in the human body, which is why they cannot be studied on the example of laboratory animals. There are also very few of them - only one percent of the total number of cells in the intestinal walls, which also creates certain difficulties in studying them.

Researchers from two institutes have created a special method for studying gastrointestinal cells by growing tiny organoids from human stem cells. These organoids mimic intestinal cells, and they are grown in the laboratory.

Artificially, they managed to increase the number of hormone-producing cells. An increase in the activity of the neurogenin-3 gene played an important role in this. Further, in these mini-intestines, various cells were marked with different colors, which made it possible to study several different hormones in them at once.

According to Jens Pushkov from the Habrecht Institute, the atlas created by scientists from the Netherlands will allow us to study the relationship between hormones, receptors and other genes used by cells.

## **Main part**

The cardiac glands of the esophagus are simple branched tubular glands that are located in their own plate of the mucous membrane. They are located at the level of the cricoid cartilage of the larynx and the 5th ring of the trachea, as well as in the lower part of the esophagus, near the entrance to the stomach.

Own gastric glands are the most numerous. According to various sources, there are 35 million of them in the stomach. In structure, they are simple unbranched, sometimes very weakly branched tubular glands. At the same time, each gland has an isthmus, a neck and a main part. The length of one gland is about 0.65 mm, its diameter ranges from 30 to 50 microns

Endocrinocytes are divided into two types: open and closed. The first ones contact directly with food and the apical part opens into the lumen of the gland. The latter react to changes in the chemical composition of the internal environment, the content of regulatory substances, mechanical stretching of stomach tissues, and do not have direct contact with the external environment.

The cardiac glands of the stomach are simple tubular with strongly branched ends.

Also, the duodenal glands have a special difference from others. The rest of the gastrointestinal tract contains glands with a relatively similar structure.

EC cells that produce serotonin, ECL cells, histamine producers, G cells that produce gastrin are located in the cardiac glands of the esophagus.

P-cells produce bombesin, PP- cells produce pancreatic polypeptide, A-cells produce enteroglucagon, D-cells form the hormone somatostatin, D1-cells form the hormones vasointestinal polypeptide (VIP) and ghrelin. These types of cells are located in their own gastric glands.

PYY endocrinocytes are found in the endocrinocytes of the small intestine. These endocrinocytes secrete the YY-polypeptide.

## **Materials and methods**

Experimental analysis of data on gastrointestinal hormones, data from the Internet, personal records of researchers from the Habrecht Institute.

## Results and discussions

2012 marked the 110th anniversary of the experiment conducted on January 16, 1902 by Bayliss and Starling. Scientists, when cutting the nerve connections between all organs of the gastrointestinal tract, found that the introduction of acid into the small intestine stimulates the secretion of the pancreas. The researchers found that the extract of the mucous membrane of the small intestine stimulates the secretion of the pancreas. Bayliss and Starling thereby discovered secretin and introduced a new concept of regulating the activity of the body through "chemical information from the blood." It is because of this discovery that the science of endocrinology appeared, as well as the endocrinology of the gastrointestinal tract received its development.

In 1980, the classification of endocrine cells was adopted, according to which 19 types of endocrinocytes are distinguished. This classification is still maintained and is based on the classification adopted in 1977 in Lausanne. According to her, 15 types of endocrinocytes were distinguished.

## Conclusion

By the discovery of the action of various gastrointestinal hormones, a real breakthrough has occurred in the treatment of type 2 diabetes mellitus. For the further development of this topic and the discovery of all new hormones, except insulin, performing similar functions, endocrinocytes are subject to further study.

## REFERENCES

1. Хамидова Ф. М., Исмаилов Ж. М., Якубов М. З. РОЛЬ ЭНДОКРИНОЦИТОВ ГОРТАНИ В РАЗВИТИИ МЕТАПЛАСТИЧЕСКИХ ПРОЦЕССОВ НА ФОНЕ ЭКСПЕРИМЕНТАЛЬНОГО ХРОНИЧЕСКОГО ЛАРИНГИТА //Вопросы науки и образования. – 2022. – №. 3 (159). – С. 39-51.
2. Blinova S. A., Khamidova F.M., Ismailov J.M. The state of the immune and regulatory structures of the bronchial mucosa in pulmonary pathology in children. Reviewed Journal. EPRA International Journal of Socio-Economic and Environmental Outlook (SEEO).2020;7(2):21-23.
3. Blinova S.A., Khamidova F.M., Urakov K.N. Endocrine structures of the lungs in ontogenesis and in children with pneumonia. The American Journal of Medical Sciences and Pharmaceutical Research. 2020;2(9):19-22.
4. Blinova S. A., Khamidova F.M., Ismailov J.M. The state of the immune and regulatory structures of the bronchial mucosa in pulmonary pathology in children. Reviewed Journal. EPRA International Journal of Socio-Economic and Environmental Outlook (SEEO) 2020. - V.7, № 2. - P21-23.
5. ABOUT THE CAUSES OF ENDOMETRIAL HYPERPLASIA AND FORMS OF ENDOMETRIAL HYPERPLASIA SV Vladimirovna - ResearchJet Journal of Analysis and Inventions, 2022
6. АНТИБИОТИКОРЕЗИСТЕНТНОСТЬ ИЛИ БОРЬБА С ГЛОБАЛЬНОЙ УГРОЗОЙ XXI ВЕКА V Sarkisova, A Numonova, R Xegay - Science and innovation, 2022
7. АСПЕКТЫ СОСТОЯНИЯ ВЕГЕТАТИВНОЙ НЕРВНОЙ СИСТЕМЫ ПРИ ГИПОКСИИ V Sarkisova, A Numonova, R Xegay - Science and innovation, 2022
8. CAUSES, DIAGNOSIS, CONSERVATIVE AND OPERATIVE TREATMENT OF UTERINE MYOMA V Sarkisova, R Xegay - Science and innovation, 2022

9. ВЗАИМООТНОШЕНИЕ РЕАКТИВНОСТИ ВЕГЕТАТИВНОЙ НЕРВНОЙ СИСТЕМЫ И МОРФОФУНКЦИОНАЛЬНОЙ АКТИВНОСТИ БАЗОФИЛЬНЫХ КЛЕТОК АДЕНОГИПОФИЗА В ПОСТРЕАНИМАЦИОННОМ ПЕРИОДЕ АГ Карабаев - Наука и мир, 2020
10. ВЗАИМООТНОШЕНИЕ РЕАКТИВНОСТИ ВЕГЕТАТИВНОЙ НЕРВНОЙ СИСТЕМЫ И МОРФОФУНКЦИОНАЛЬНОЙ АКТИВНОСТИ БАЗОФИЛЬНЫХ КЛЕТОК АДЕНОГИПОФИЗА В ПОСТРЕАНИМАЦИОННОМ ПЕРИОДЕ АГ Карабаев - Наука и мир, 2020
11. Патогенетические основы нарушения морфофункциональной активности аркуатного ядра гипоталамуса в постреланимационном периоде\* АГ Карабаев - Журнал Новый день в медицине, 2021
12. REACTIVITY OF THE AUTONOMIC NERVOUS SYSTEM IN PREGNANT WOMEN WITH IRON DEFICIENCY ANEMIA OF MODERATE SEVERITY MA Karabaeva - Next Scientists Conferences, 2022
13. LEVELS OF PREGNANCY INFLAMMATION IN PHOSPHOROGANIC PESTICIDE POISONING KD Safoevna, MU Nematovna, LZ Xidirovna - Archive of Conferences, 2021
14. I. Tohirova J., Shernazarov F. ATHEROSCLEROSIS: CAUSES, SYMPTOMS, DIAGNOSIS, TREATMENT AND PREVENTION //Science and innovation. – 2022. – Т. 1. – №. D5. – С. 7-12.
15. Farhod o'g'li S. F. GASTRIT—SABABLARI, ALOMATLARI, TASHXISLASH, DAVOLASH, DORILAR, ASORATLARI, OLDINI OLISH //Лучший инноватор в области науки. – 2022. – Т. 1. – №. 1. – С. 103-107.
16. Tohirova J., Shernazarov F. ATHEROSCLEROSIS: CAUSES, SYMPTOMS, DIAGNOSIS, TREATMENT AND PREVENTION //Science and innovation. – 2022. – Т. 1. – №. D5. – С. 7-12.
17. F. Shernazarov ATHEROSCLEROSIS: CAUSES, SYMPTOMS, DIAGNOSIS, TREATMENT AND PREVENTION // SAI. 2022. №D5. URL: <https://cyberleninka.ru/article/n/atherosclerosis-causes-symptoms-diagnosis-treatment-and-prevention> (дата обращения: 20.10.2022).
18. F. Shernazarov, J. Tohirova, D. Jalalova TYPES OF HEMORRHAGIC DISEASES, CHANGES IN NEWBOENS, THEIR EARLY DIAGNOSIS // SAI. 2022. №D5. URL: <https://cyberleninka.ru/article/n/types-of-hemorrhagic-diseases-changes-in-newboens-their-early-diagnosis> (дата обращения: 20.10.2022).
19. Qizi T. J. I., Farrukh S. TREATMENT OF MYOCARDIAL INFARCTION AND FIRST AID //Science and innovation. – 2022. – Т. 1. – №. D3. – С. 317-320.
20. Shernazarov F., Azimov A. INCREASED BRAIN PRESSURE-CAUSES, SYMPTOMS, COMPLICATIONS, TREATMENT //Современная медицина: новые подходы и актуальные исследования. – 2021. – С. 73-77.
21. qizi Tohirova J. I., og'li Ibragimov B. I., og'li Shernazarov F. F. CONGENITAL HEART DISEASE-CAUSES, CLASSIFICATION, DIAGNOSIS, TREATMENT, COMPLICATIONS, CONSEQUENCES //Eurasian Journal of Medical and Natural Sciences. – 2022. – Т. 2. – №. 3. – С. 84-89.
22. Mratbaevna W. N., Farrux S. The Structure of the Heart and its Physiology in Regular Athletes //Eurasian Scientific Herald. – 2022. – Т. 8. – С. 102-105.

23. Farhod o'g'li S. F. GASTRIT—SABABLARI, ALOMATLARI, TASHXISLASH, DAVOLASH, DORILAR, ASORATLARI, OLDINI OLISH //Лучший инноватор в области науки. – 2022. – Т. 1. – №. 1. – С. 103-107.
24. Фаррух Ш. и др. ПУТИ УСТРАНЕНИЯ САХАРНОГО ДИАБЕТА //Science and innovation. – 2022. – Т. 1. – №. D3. – С. 313-316.
25. ПУТИ УСТРАНЕНИЯ САХАРНОГО ДИАБЕТА. Тоҳирова Жайрона Иззатилло Қизи, Шерназаров Фаррух «Science and innovation» 2022 yil 3-sonida 313-316 bet <https://doi.org/10.5281/zenodo.6803520>
26. Shernazarov Farrukh. (2022). TREATMENT OF MYOCARDIAL INFARCTION AND FIRST AID. "science and Innovation" International Scientific Journal. ISSN: 2181-3337, 1(3), 317–320. <https://doi.org/10.5281/zenodo.6803550> Shernazarov Farrux. Eurasian Scientific Herald