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MORPHOMETRIC PARAMETERS OF THE STOMACH WALL OF WHITE RATS WITH CHRONIC RADIATION SICKNESS AND CORRECTION WITH A BIOSTIMULANT IN POSTNATAL ONTOGENESIS

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✓ ***Resume***

The choice of the stomach for research is dictated by the fact that 35% of people suffer from various diseases of this organ; gastritis and peptic ulcer of the stomach make up the predominant percentage among patients, and at the same time, information about the fine structure of all the constituent walls of the stomach in the scientific literature is extremely insufficient. Studies of the morphometric parameters of the stomach showed that the indicators of its length, width, thickness of all layers that make up the wall of the studied organ, as well as the length of the greater and lesser curvature, change unevenly and unevenly with age.

Keywords: stomach, stomach wall, mucous membrane, lymph, tissue

ПОСТНАТАЛ ОНТОГЕНЕЗДА ОҚ ЗОТСИЗ КАЛАМУШЛАР ОШҚОЗОНИ ДЕВОРИНИНГ СУРУНКАЛИ НУР КАСАЛЛИГИДА ВА БИОСТИМУЛЯТОР ТАЪСИРИДАГИ МОРФОМЕТРИК КЎРСАТКИЧЛАРИ

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Резюме

Тадқиқот учун ошқозонни танланиши 35% инсонлар ушбу органнинг турли касалликларидан азият чекишади. Уларнинг асосийлари гастрит ва ошқозон яраси бўлиб беморлар орасида асосий фоизни ташкил қилади. Илмий адабиётларда ошқозоннинг барча таркибий деворларининг нозик тузилиши ҳақидаги маълумотлар жуда кам. Ошқозоннинг морфометрик параметрларини ўрганиш шуни кўрсатдики, унинг узунлиги, кенглиги, ўрганилаётган орган деворини ташкил этувчи барча қатламларнинг қалинлик, кўрсаткичлари ёшга қараб нотекис равишда ўзгаради.

Калит сўзлар: Ошқозон, ошқозон девори, шиллиқ қават, лимфа, тўқима.

МОРФОМЕТРИЧЕСКИЕ ПОКАЗАТЕЛИ СТЕНКИ ЖЕЛУДКА БЕЛЫХ КРЫС С ХРОНИЧЕСКОЙ ЛУЧЕВОЙ БОЛЕЗНЬЮ И КОРРЕКЦИЯ БИОСТИМУЛЯТОРОМ В ПОСТНАТАЛЬНОМ ОНТОГЕНЕЗЕ.

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Резюме

Выбор желудка для исследования продиктован тем, что 35% людей страдают различными заболеваниями этого органа; гастриты и язвенная болезнь желудка составляют преобладающий процент среди больных, и в то же время сведения о тонком строении всех составляющих стенок желудка в научной литературе крайне недостаточны. Исследования морфометрических параметров желудка показали, что показатели его длины, ширины, толщины всех слоев, составляющих стенку изучаемого органа, а также длина большой и малой кривизны с возрастом изменяются неравномерно.

Ключевые слова: желудок, стенка желудка, слизистая оболочка, лимфа, ткань.

Relevance

According to the forecasts of the World Health Organization, by the middle of the 21st century, diseases of the digestive system will occupy one of the leading places. This is mainly due to a person's lifestyle (stress, poor nutrition, physical inactivity, bad habits), environmental pollution, consumption of low-quality food. Among the factors that have a negative effect on people, ionizing radiation occupies a separate place, since it destroys the balance of the body's metabolism and causes significant changes in the organs of the digestive system, which is highly sensitive to radiation. Therefore, the International Labor Organization has included it in the list of carcinogens that cause occupational cancer. Despite this, "... the number of radiation objects is increasing by 10% per year, while the number of activities on them by 4% ...". This shows that the problem of irradiation is not only radiobiological, but also medical and social, and the search for its solution is an urgent task.

The choice of the stomach for research is dictated by the fact that 35% of people suffer from various diseases of this organ [3,7]; gastritis and peptic ulcer of the stomach make up the predominant percentage among patients, and at the same time, information about the fine structure of all the constituent walls of the stomach in the scientific literature is extremely insufficient.

On the one hand, the mucous membrane of the organs of the digestive system is a barrier structure that prevents the penetration of various agents of the external world into the body, and on the other hand, it participates in the exchange processes between the external and internal environment of the body. Due to its proximity to the microbiota and direct contact with food, it is constantly exposed to both “normal” and potentially harmful antigens [16,17,19].

Of the physical factors, the effect of ionizing radiation on the digestive system has been most thoroughly studied. As is known, in chronic radiation sickness there is a gradual decrease in the secretory function of the gastric glands [18]. These deviations are well compensated and may not be accompanied by subjective disorders for a long time. As the general pathological process worsens, unstable disorders of secretory-motor activity are replaced by more persistent and regular inhibition of secretion [1,5].

Socio-ecological factors lead to a progressive increase in the number of diseases in humans and animals and actualize to an increasing extent the problem of obtaining biologically active substances for the correction of metabolism and imkmunity [13,22].

The research of academician V.P. Filatov and his colleagues discovered a new group of natural biologically active substances called "biogenic stimulants". These drugs have found their application in various fields of modern clinical medicine in the form of preparations of plant, animal, and mixed origin [23]. Biogenic stimulants and adaptogens increase the body's overall resistance to physical and emotional stress. A rich spectrum of biologically active compounds (BAS) contained in the raw materials of many plants provides a general health-improving (organ-protective) effect on the body along with a specific pharmacological effect [12,14].

Among the existing means of tissue therapy, ASD occupies a special place. It is a powerful stimulant of the vital functions of the body, both when administered orally and parenterally. When applied topically, in addition to stimulating, it also has an antiseptic effect [4,6].

It follows from the studies that ASD - 2f, electroactivated by colloidal silver ions, has increased medicinal properties and biocidal action [2,8,10,11]. Information about the features of the anatomical structure of the gastrointestinal tract of white rats can be obtained from the works of many authors who are engaged in experimental modeling of various pathological conditions of the digestive system. The validity of using these laboratory animals for these purposes is explained by the fact that, according to these authors, the digestive tract of humans and white rats has more similarities than differences [15].

Currently, researchers continue to search for imkmunomodulatory correction. But deciphering the connections of the lymphoid system with biostimulants is much more promising for research in the search for the elimination of the above factors. This also applies to the mechanisms of morphogenesis of all constituent structures of the stomach at any stage of ontogenesis. In recent years, it has been shown that the connections of the lymphatic and lymphoid systems stem from the connections of their morphofunctional and genetic bases [9].

At the present stage in morphology and clinical medicine, more and more importance is attached to critical periods in the development of the body, as well as correction with the help of various biostimulants. Experimental studies on ASD fraction 2 and its imkmunomodulatory properties are not yet sufficient. Therefore, further, deeper study of the chemical structure of the ASD preparation, the isolation of active substances in its pure form, the study of the biochemical mechanism of the pharmacological action of this preparation will allow us to develop more rational recomkmendations for the use of a biostimulant in medicine [21,24].

The degree of influence of the preliminary correction of chronic radiation sickness with the antiseptic-stimulant Dorogov of the second fraction is unknown. The relevance and necessity of studying these problems are quite obvious, since the disclosure of the mechanisms and morphological foundations of the adaptation of the gastrointestinal tract will make it possible to clarify very important points - morphological and functional features in different age periods, interorgan and intertissue relationships in the physiological and pathological state after chronic irradiation.

A study of the available literature data revealed a lack of information about the effect of the ASD preparation on the digestive system, namely on the function and morphology of the stomach. In addition, changes in the stomach during radiation exposure (chronic radiation sickness) and its correction with the help of a biostimulator (ASD) is an open issue to this day.

Aim of study: To reveal morphometric parameters of the stomach wall of white rats with chronic radiation sickness and correction with a biostimulant in postnatal ontogenesis

Materials and methods

For the purpose of the study, 126 white outbred male rats were tested in the following age categories - at the age of 3 and 6 months, kept under normal vivarium conditions. These conditions of keeping the animals included keeping them in separate cages at room temperature, natural light and ventilation. At the initial stages of the ongoing scientific experiment, all sexually mature rats were in quarantine for seven days, and after the exclusion of somatic or infectious diseases, they were transferred to the usual vivarium mode. Throughout the experiment, careful monitoring of the physiological state and behavior of animals in the control group and comparison groups was carried out.

To determine the morphometric parameters of the structure of the stomach in postnatal ontogenesis, the test mamkmals in the age category of 3 and 6 months were divided into 2 groups (n=96). I–group – control (n=52); II - group - rats that received irradiation for 20 days from the age of 2 months at a dose of 0.2 Gy (total dose was 4.0 Gy) and after the completion of the course of irradiation received the drug ASD-2f at a dose of 0.1 ml of pure ASD - 2f dissolved in 0.4 ml of distilled water (n=32).

The above dosages of ASD - 2f were calculated using empirical methods and were administered every day intragastrically as a solution. In order to achieve modeling of chronic radiation sickness, irradiation of rats was carried out with the help of an apparatus manufactured in Estonia - DTHT AGAT P1 with a power of 25.006 s Gy / min for 20 days from 2 months of age at a dose of 0.2 Gy (total dose was 4.0 Gy).

In relation to those animals that made up the control group, distilled water in a volume of 0.5 ml was introduced into the stomach through a metal probe for 20 days.

At the next stage, the weight of the animals was determined using scales, and the anatomical parameters of the extracted stomach were measured with a caliper. The thickness of the mucous, submucosal, muscular and serous membranes of the stomach wall was measured.

In order to conduct morphological and morphometric studies, the extracted stomach was fixed in Bouin's solution and, after appropriate wiring, the material was embedded in paraffin according to generally recognized rules. Next, histological transverse sections 6–7 mkm thick were prepared from the cardiac and pyloric sections of the stomach, followed by their clarification in alcohols of increasing concentration. The sections were stained after deparaffinization with hematoxylin-eosin and by the Van-Gazon method. Morphometric studies and measurements of stomach tissues were carried out under an NLCD-307B microscope.

Result and discussion

It has been established that in laboratory animals of the control group of 3 months of age, the stomach is fully formed. In the course of studying the parameters of the stomach of 3-month-old animals, the following indicators were obtained:

The body weight of 3-month-old rats ranges from 88 g to 133 g, averaging 114.16±4.14 g. When comparing these indicators with those in newborn rats, it was found that the weight gain of the animals was 22.04 times. The length of the stomach of 3-month-old rats of group I ranges from 30 to 33 mkm, averaging 31.67 ± 0.27 mkm. The width of the stomach is 13-15 mkm, on average it is 13.63±0.18 mkm. The thickness of the examined organ varies from 11 to 13 mkm, on average 11.81±0.18 mkm. The length of the greater curvature ranges from 34 to 37 mkm, averaging 35.24 ± 0.27 mkm. The length of the lesser curvature is 13-14 mkm, on average it is 12.82 ± 0.09 mkm.

During the study, it was determined that in 3-month-old animals of the control group, the total wall thickness of the studied organ in the cardiac region varies from 408.3 microns to 542.1 microns, on average it is 483.7±12.31 microns; in the pyloric region from 446.7 to 633.2 microns, on average - 574.6±17.16 microns. The thickness of the muscular membrane in the cardiac region ranges from 130.4 to 224.1 microns, on average - 151.3±8.62 microns; in the pyloric region from 196.1 to 294.7 microns, on average - 231.3±9.07 microns. The thickness of the circular layer of the cardiac section is in the range - 55.1 microns to 80.4 microns, on average 60.6 ± 2.33 microns; pyloric region from 58.9 to 91.3 mkm, on average -75.2±2.98 mkm. The thickness of the longitudinal layer in the cardiac region varies from 78.4 mkm to 123.6 mkm, on average 89.7±4.16 mkm; in the pyloric region from 128.1 to 196.3 microns, on average - 155.9±6.27 microns. The thickness of the mucous membrane in the cardiac region ranges from 294.7 to 428.5 microns, on average it is 301.4±12.31 microns; in the pyloric region from 286.4 to 355.1 microns, on average - 309.3±6.32 microns. The thickness of the submucosa of the cardiac section is in the range - 20.6 microns to 40.8 microns, on average - 28.6 ± 1.86 microns; pyloric section from 26.4 to 36.4 microns, on average - 32.4±0.82 microns. The height of the mucosal glands in the cardiac region ranges from 13.1 mkm to 18.6 mkm, on average 15.2±0.51 mkm; in the pyloric region from 10.3 to 16.7 microns, on average - 13.5±0.59 microns. The height of the mucosal folds in the cardiac region varies from 251.8 mkm to 409.2 mkm, on average 286.7±14.48 mkm; in the pyloric region from 261.6 to 324.1 microns, on average - 288.1±5.75 microns. The body weight of 6-month-old rats in the control group varied from 195 g to 242 g, averaging 220.2±5.08 g. When comparing these indicators with the data of 3-month-old rats, it was revealed that in 6-month-old animals, an increase in body weight was noted by 1.93 times.

The length of the stomach of 6-month-old rat pups in the control group ranges from 33 to 35 mkm, averaging 34.25±0.21 mkm. The width of the stomach is 13-15 mkm, on average it is 13.81±0.21 mkm. The thickness of the examined organ varies from 12 to 15 mkm, on average 13.69±0.32 mkm. The length of the greater curvature is in the range of 37 - 38 mkm, on average it is 37.43 ± 0.10 mkm. The length of the lesser curvature is 14-15 mkm, on average it is 14.65 ± 0.10 mkm. The study of morphometric parameters of the stomach of rats of this age were as follows. The total thickness of the wall of the organ of 6-month-old white rats in the cardiac region is in the range of - 671.8 - 814.5 microns, on average - 738.6 ± 15.41 microns; in the pyloric region from 786.9 to 973.1 microns, on average - 832.4±20.11 microns. The thickness of the muscular membrane in the cardiac region varies from 228.6 to 274.2 microns, on average - 240.2±4.92 microns; in the pyloric region from 301.3 to 404.9 microns, on average - 338.4±11.19 microns. The thickness of the circular layer of the cardiac region ranges from 87.6 mkm to 110.8 mkm, on average 96.3±2.51 mkm; pyloric section from 99.6 to 126.4 microns, on average - 113.1±2.89 microns. The thickness of the longitudinal layer in the cardiac section corresponds to the indicators - from 133.4 microns to 162.2 microns, on average - 142.9±3.11 microns; in the pyloric region from 206.8 to 958.9 microns, on average - 225.3±5.63 microns. The thickness of the mucous membrane in the cardiac section is in the range - 434.3 to 512.1 microns, on average - 458.4 ± 8.40 microns; in the pyloric region from 373.4 to 489.2 microns, on average - 443.4±12.51 microns. The thickness of the submucosa in the cardiac region is 39.6 microns to 45.79 microns, on average it is 41.3 ± 0.66 microns; in the pyloric region from 39.1 to 51.9 microns, on average - 46.8±1.38 microns. The height of the glandular structures of the mucous membrane of the cardiac region varies from 19.2 mkm to 27.4 mkm, on average - 23.4±0.89 mkm; pyloric section from 18.9 to 24.1 microns, on average - 20.3 ± 0.56 microns. The height of the mucosal folds in the cardiac region ranges from 426.5 to 503.1 mkm, averaging 441.3±8.27 mkm; in the pyloric region from 364.5 to 461.6 microns, on average - 410.1±10.49 microns. table 1.

Morphometric features of the stomach wall of white rats with chronic radiation sickness, who took ASD-2f after the end of the course of irradiation

When modeling chronic radiation sickness in 3-month-old irradiated rats, the study of the stomach made it possible to obtain the following data:

The body weight of the animals varied from 92 g to 106 g, on average it was -105.0±1.51 g. A comparative analysis of the obtained indicators with the data of newborn rat pups showed that the weight gain of the animals was noted by 20.85 times. The length of the stomach of 3-month-old rats in the irradiated group ranges from 31 to 32 mkm, averaging 31.46±0.11 mkm. The width of the stomach is 13-15 mkm, on average it is 14.04±0.22 mkm. The thickness of the organ varies from 11 to 12 mkm, on average - 11.21±0.22 mkm. The length of the greater curvature varies from 33 to 34 mkm, averaging 33.48 ± 0.22 mkm. The length of the lesser curvature is 13-14 mkm, on average it is 13.43 ± 0.22 mkm.

Cardiac department			Pyloric department	
	3 month old white rats	6 month old white rats	3 month old white rats	6 month old white rats
Total stomach wall thickness	55,4%	52,7%	52,7%	44,9%
Mucosal thickness	57,3%	52,1%	41,0%	43,4%
Height folds	62,7%	53,9%	49,1%	42,3%
glandular tissue	56,7%	53,9%	30,8%	17,0%
Submucosal the foundation	58,9%	44,4%	24,0%	24,4%
Muscular layer	62,3%	58,8%	31,0%	18,0%
Circular muscle layer	57,0%	58,9%	28,6%	19,2%
longitudinal muscle layer	64,3%	58,6%	29,9%	19,5%

Table 1. The rate of growth of the stomach wall of white outbred rats is normal

In experimental animals 3 months of age, the total thickness of the stomach wall in the cardial section is in the range of - 414.3 microns to 539.2 microns, on average - 471.3 ± 13.48 microns, in the pyloric section - from 451.6 to 714.3 microns, on average - 591.7±28.37. The thickness of the muscular membrane in the cardiac region varies from 131.3 to 214.8 microns, on average - 154.6 ± 9.02 microns, in the pyloric region - from 198.3 to 288.1 microns, on average - 237.6 ±9.70. The thickness of the circular layer in the cardiac region ranges from 57.4 mkm to 76.3 mkm, averaging 63.9 ± 2.04 mkm, in the pyloric region - from 56.4 to 92.1 mkm, averaging 76.4 ±3.86. The thickness of the longitudinal layer in the cardiac region varies from 82.3 mkm to 124.6 mkm, on average - 90.7 ± 4.57 mkm, in the pyloric region - from 130.3 to 192.4 mkm, on average - 161.1 ±6.71. The thickness of the mucous membrane in the cardiac section corresponds to 301.4 to 394.3 microns, on average - 286.8 ± 10.03 microns, in the pyloric section - from 264.7 to 366.4 microns, on average - 316.7 ± 10.98. The thickness of the submucosa in the cardiac region is in the range - 21.4 microns to 36.6 microns, on average - 29.1 ± 1.64 microns, in the pyloric region - from 25.8 to 38.3 microns, on average - 31.0±1.35. The height of the glands of the mucous membrane in the cardiac region ranges from 12.8 mkm to 17.4 mkm, on average - 14.1 ± 0.50 mkm, in the pyloric region - from 10.8 to 17.2 mkm, on average - 13.8 ±0.69. The height of the mucosal folds in the cardiac region varies from 201.3 mkm to 306.3 mkm, on average - 259.2 ± 11.34 mkm, in the pyloric region - from 242.4 to 336.8 mkm, on average - 291.4±10.20.

In 6-month-old rats of the irradiated group, the body weight was in the range from 166 to 242 g, averaging 217.8±8.21 g. Comparison of these indicators with those of 3-month-old rats showed that in 6-month-old animals, weight gain was noted by 2.07 times.

The length of the stomach of 6-month-old rats in the irradiated group ranges from 34 to 35 mkm, averaging 34.23±0.22 mkm. The width of the stomach is 13-15 mkm, on average it is 13.81±0.22 mkm. The thickness of the organ varies from 12 to 13 mkm, on average - 12.43±0.22 mkm. The length of the greater curvature varies from 36 to 37 mkm, averaging 36.26 ± 0.11 mkm. The length of the lesser curvature is 13-14 mkm, on average it is 13.83 ± 0.11 mkm. It has been established that in chronic radiation sickness in 6-month-old laboratory animals, the total thickness of the stomach wall in the cardiac region ranges from 664.2 mkm to 758.1 mkm, on average - 719.8 ± 10.14 mkm, in the pyloric region - from 728.4 to 856.3 microns, on average - 786.3 ± 13.81. The thickness of the muscular membrane in the cardiac region is in the range - 216.4 to 281.3 microns, on average - 2229.3 ± 7.01 microns, in the pyloric region - from 294.2 to 368.1 microns, on average - 324, 3±7.98. The thickness of the circular layer in the cardiac region varies from 88.6 mkm to 104.1 mkm, on average - 92.4 ± 1.67 mkm, in the pyloric region - from 94.1 to 118.3 mkm, on average - 104.7 ±2.61. The thickness of the longitudinal layer in the cardiac region ranges from 130.2 mkm to 148.6 mkm, on average - 136.8±1.99 mkm, in the pyloric part - from 198.6 to 221.3 mkm, on average - 219.6 ±2.45. The thickness of the mucous membrane in the cardiac section is in the range - 403.8 - 500.9 microns, on average - 453.1 ± 10.49, in the pyloric section - from 384.9 to 471.7 microns, on average - 414.8 ±9.37 mkm. The thickness of the submucosa in the cardiac region corresponds to the values from 30.8

mkm to 39.7 mkm, on average it is 36.2 ± 0.96 mkm, in the pyloric region it is from 38.8 mkm to 43.1 mkm, on average it is – 40.2±0.46 mkm. The height of the glandular structures of the mucous membrane in the cardiac region ranges from 17.5 mkm to 23.4 mkm, on average 20.6 ± 0.64 mkm, in the pyloric region - from 17.9 to 22.6 mkm, on average 19 .1±0.51. The height of the mucosal folds in the cardiac region correspond to the data from 396.3 mkm to 458.4 mkm, on average they are 422.9 ± 6.71 mkm, in the pyloric region - from 359.7 to 423.1 mkm, on average – 392.1±5.77. table 2.

Conclusion

In the control (intact) group of laboratory animals, the highest increase in body weight was observed at the age of 3 months, that is, 22.04 times. In the experimental group, the highest increase in body weight of the animals of the irradiated group was observed at the age of 6 months. In the experimental group, all parameters of physical development lag behind the control by 1.6 times. Studies of the morphometric parameters of the stomach showed that the indicators of its length, width, thickness of all layers that make up the wall of the studied organ, as well as the length of the greater and lesser curvature, change unevenly and unevenly with age. In experimental animals with chronic radiation exposure, the growth rate of these data lags significantly behind similar indicators in animals of the control group. X-ray irradiation adversely affected the structure, number and size of glands located in the mucous membrane and submucosa of the gastric wall. Normally, when the animals of the control group reach the age of 3 months, the mucous membrane and submucosa of the stomach wall are already well developed, which is evidence that with increasing age, white rats switch to mixed nutrition. The glandular structures of these layers of the gastric wall of 3-month-old rat pups are ready for the production of gastric juice and digestion of food.

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РЕПАРАТИВНАЯ РЕГЕНЕРАЦИЯ ТКАНЕЙ УШНОЙ РАКОВИНЫ ИГОЛЬЧАТЫХ МЫШЕЙ РОДА ACOMYS

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✓ ***Резюме***

Среди млекопитающих наблюдаются единичные и уникальные примеры, обладающие ускоренной регенерацией. Колючие мыши или мыши рода Acomys являются одними из немногих представителей класса млекопитающих с повышенной способностью к регенерации, к восстановлению функциональности тканей без развития рубцевания и фиброза.

Целью данного исследования является оценка постравматического гистогенеза тканей ушной раковины мышей Acomys в сравнении с мышами линии Balb/c.

Результатами эксперимента являются доказательства способности полного восстановления функционала и гистоархитектоники тканей ушной раковины мышей рода Acomys после ее травматизации.

Понимание механизмов регенерации данного вида дает возможность дальнейшей разработки генно-клеточных технологий для лечения различных дефектов.

Ключевые слова: Регенерация, ушная раковина, хрящ, Acomys.

POST-TRAUMATIC HISTOGENESIS OF AURICLE TISSUES OF SPINY MOUSE ACOMYS

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✓ ***Resume***

Isolated and unique examples with accelerated regeneration are observed among mammals. Spiny mice or mice of the genus Acomys are one of the few representatives of the class of mammals with an increased ability to regenerate, to restore the functionality of tissues without the development of scarring and fibrosis.

The aim of this study is to evaluate the posttraumatic histogenesis of the auricle tissues of Acomys mice in comparison with Balb/c mice.

The results of the experiment are evidence of the ability to fully restore the functionality and histoarchitectonics of the auricle tissues after injury, including elastic cartilage, by mice Acomys.

Understanding the mechanisms of regeneration of this species makes it possible to further develop gene-cell technologies for the treatment of various defects.

Keywords: Regeneration, Auricle, Cartilage, Acomys.

IGNALI ACOMYS TURIDAGI SICHQONLAR QULOQ TO'QIMLARINI REPARATIV REGENERATSIYA

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✓ ***Rezume***

Sutemizuvchilar orasida tezlashtirilgan regeneratsiyaga ega yagona va noyob misollar mavjud. Acomys jinsining tikanli sichqonlari yoki sichqonlari sut emizuvchilar sinfining kam sonli vakillaridan biri bo'lib, regeneratsiya qilish, chandiq va fibrozni rivojlantirmasdan to'qimalarning funksionalligini tiklash qobiliyatini oshiradi.

Ushbu tadqiqotning maqsadi Balb/c sichqonlari bilan solishtirganda Acomys sichqonlarining quloq suprasi to'qimalarining posttravmatik gistogenezini baholashdir.

Tadqiqot natijalari jarohatlanishidan so'ng Acomys turdagi sichqonlarning quloq suprasi to'qimalarining funksionalligi va gistarxitektonikasini to'liq tiklash qobiliyatidan dalolat beradi.

Ushbu turdagi sichqonlarining regeneratsiya mexanizmlarini tushunish turli nuqsonlarni davolash uchun gen-hujayra texnologiyalarini yanada rivojlantirish imkonini beradi.

Kalit so'zlar: Regeneratsiya, quloq suprasi, tog'ay, Acomys.

Актуальность

Регенерация – это способность живых организмов со временем восстанавливать повреждённые ткани и клетки. Регенерация может быть физиологической - замена клеток и тканей в процессе жизнедеятельности организма, и репаративной, которая осуществляется в ответ на повреждение.

Практически все млекопитающие обладают свойствами полной физиологической и частично репаративной регенерации. Так, представители грызунов, способны к восстановлению кончиков пальцев [1,2], плоды млекопитающих способны к регенерации обширных участков кожи [1], олени-самцы могут ежегодно восстанавливать свои рога [3], сердце новорожденных мышей может восстанавливаться после повреждения до седьмого постнатального дня [4].

Но следует признать, что многие восстановительные процессы млекопитающих являются ограниченными и неполноценными в отличие от представителей других классов.

Среди млекопитающих наблюдаются единичные и уникальные примеры, обладающие ускоренной регенерацией. Колючие мыши или мыши рода Acomys являются одними из немногих представителей класса млекопитающих с повышенной способностью к регенерации, к восстановлению функциональности тканей без развития рубцевания и фиброза.

Сравнение и изучение способностей к восстановлению тканей A. с другими млекопитающими даст возможность обнаружить клеточные и молекулярные сигналы, управляющие процессами регенерации тканей.

Одной из моделей повреждения тканей для комплексной оценки регенеративных способностей является травматизация ушной раковины. В этой модели, помимо восстановления кожного лоскута, окружающего раковину, оценивается и восстановление целостности эластического хряща и мышцы, располагающееся в толще дермы [5].

Таким образом, целью данного исследования является оценка постравматического гистогенеза тканей ушной раковины мышей Acomys в сравнении с мышами линии Balb/c.

Материал и методы

В эксперимент были включены две группы животных: самцы мышей A. Cahirinus первая группа (n=28), и самцы мышей линии Balb/c вторая группа (n=28).

Хирургическое моделирование травматизации ушной раковины было произведено по всем правилам асептики и антисептики при помощи панч-биопсии диаметром 3 мм. Ранение было нанесено по центру ушной раковины, избегая крупных сосудов Рисунок №1. В качестве анестезии был использован «Zoletil 100» в расчете 7 мг на 1 кг массы тела.

Рисунок 1. Схема травматизация ушной раковины при помощи панч-биопсии

Ткани ушной раковины забирались для дальнейшего гистологического анализа путем полного удаления раковины при условиях глубокой наркотизации животных на следующих сроках: 2, 5, 15, 30 сутки после проведения операции.

В настоящей работе использованы макроскопические и гистологические методы исследования.

Результат и обсуждения

Макроскопическая оценка

В ходе эксперимента в группе Acomys наблюдалось постепенное затягивание ушной раны до полного восстановления дефекта на 30 сутки. При чем регенерации происходила от проксимальной части к дистальной со смещение раневого отверстия от центра раны. В группе контроля наблюдалось рубцевания периферии дефекта без дальнейшего восстановления структур тканей Рисунок 2.

Рисунок 2. Внешний вид области травмы ушной раковины в контрольной группе и группе

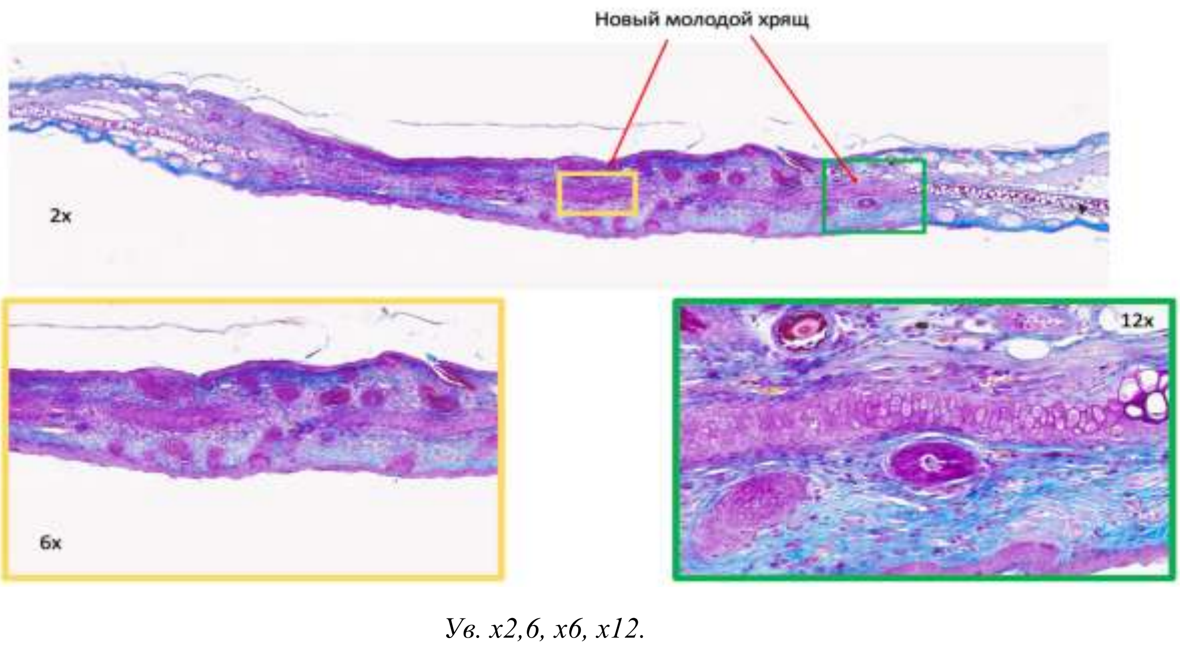
Acomys на этапах эксперимента

Гистологическая оценка

Заживление ушной раны в группе контроля происходило путем рубцевания проксимального и дистального края дефекта, в отличии от группы Acomys, где к 30 суткам наблюдалось полная репарация тканей ушной раны: эпидермис полнослоен, края сомкнуты, кожные придатки (волосяные фолликулы, сальные и потовые железы) восстановлены Рисунок 3.

В группе Acomys через 30 сут. после операции наблюдалось восстановления целостности эластического хряща. Вновь образованная хрящевая ткань отличалась базофильным матриксом, наличием структурированной надхрящницы и с четкими границами, мелкими упорядоченно расположенными хондроцитами.

Рисунок 3. Ткани ушной раковины Acomys на 30 сутки после операции. Окраска: маллори,



Ув. x2,6, x6, x12.

Выводы

Таким образом, установлено, что мыши рода Acomys способны восстанавливать все типы тканей поврежденной ушной раковины в эксперименте. Дальнейшие исследование в данной области приведет к идентификации клеточных и молекулярных механизмов, обеспечивающих повышенную регенерацию. Понимание этих данных представляет фундаментальный интерес для определения молекулярных механизмов, отвечающих за восстановление целостности тканей и клеток, а также даёт возможность дальнейшей разработки генно-клеточных технологий для лечения различных дефектов.

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