

Z.B. Yessimsitova¹, A.S. Kozhamzharova², R.T. Tagirova², S.A.Mankibaeva¹, B.A. Abdullaeva¹, I.A.Myrzakhanova², Zh.S.Uskenbay¹ 1Al-Farabi Kazakh National University 2Asfendiyarov Kazakh National Medical University

ULTRASTRUCTURE OF LIVER OF RATS IN THE CONDITIONS OF ENHANCEABLE PHYSICAL ACTIVITY WITH DIFFERENT DIET

These ultrastructures over of hepatocytes of rats are in-process brought. The morphological indexes of liver were investigated at the combined influence of physical activity and valuable ration of feed with a different power value. The presence of the expressed fatty dystrophy of hepatocytes is shown for rats being on the high-calorific balanced diet, and feed low-caloric vitaminized пищей educed absence of the looked after phenomena. Keywords: liver, dystrophy, hepatocytes, diet, rats, fats, carbohydrates, ultrastructure.

Introduction. Basis of the traditional mode of life is made by a rational feed, main principle of that is an observance balanced consumption of food on proteins, fats, carbohydrates, by vitamins and mineral substances. However, to attain practically required balanced not succeeded even at the large variety of food. In addition, the norm of albumen offered by dietitians in 1,5-2 times excels that is required to the man, in obedience to Worldwide organization of health protection. At this surplus and artificially balanced feed an organism does not get along at the leading out of products of disintegration of nutritives, and increasing weight limits motive activity, what results in the most various diseases. Generally known, that a liver is the central organ of exchange and very sensible to food influences. These ultrastructures over of hepatocytes of rats are in-process brought. The morphological indexes of liver were investigated at the combined influence of physical activity and valuable ration of feed with a different power value. The presence of the expressed fatty dystrophy of hepatocytes is shown for rats being on the high-calorific balanced diet, and a feed the low-caloric vitaminized food educed absence of the looked after phenomena. Maintenance of normal structure of liver requires a conformable in a quality and quantitative relation feed. It is already known since olden times, that food must contain, along with sufficient calorie content, also and vitamins, mineral substances and several of proteins, thus the last can be transferable amino acids. At the same time, as before about the lack of albumen drawn conclusion only on negative nitrous balance, and on the halt of height of young animals. Lately the special attention is turned on insufficient by formations of enzymes of liver. Further important and interesting information was got as a result of chemical and histological researches of maintenance of fat in a liver. While at the mixed food maintenance of fat in a liver makes 5%, at a qualitatively unsuitable feed maintenance of fat in a liver can rise to 10-15%, and it after a while can result in the irreversible defeat of liver [1-4]. On the basis of researches evidently, that fats and "transport" in form lecithin: fat from a depot acts as a lecithin in a liver, and from a liver fats are translated in a depot as a lecithin. Education and breaking up of phosphotides take place in a liver. From the results of research, touching the mechanism of action of lipotropic substances, flows out, that all lipotropic substances, after an exception only of heparin, an eventual account is assist formation of cholin. In respect of action of it, then this question is not yet found out, action, are base on lack of lipotropic substances in food however, sufficient in a high-calorie relation [5-11]. Only food substance the presence of that actively promotes fatty infiltration of liver. Yet not fully found out, what role is played by dietary factors in human pathology of hepatic illnesses. The task of our

researches was to study the ultrastructure of liver at the combined influence of physical activity and valuable ration of feed with a different power value. Materials and research methodology. The mature females of outbred white rat were used in an experiment, in an amount 18 things, three months age, with mass 160 g., identical age and size. Animals were contained in single cages and divided by three groups. Control the first group animals got ordinary feed mixture in food, second group low-calorised, vitaminized food, and the third group high calorised food. The dosed physical activity animals got through swimming in water of 18-20% in a flow 30 minutes. For the electro-microscopic analysis pieces of liver fixed in 2,5% solution of gluteraldehyde with post-fixing in 1% solution of osmium tetroxide. Bioplates conducted on the generally accepted methodology and concluded in ethon. Semithin cuts were painted by mixture of methylene blue azur- 2 and basic fuksin. Ultra-thin cuts were prepared on the ultramicrotome of "Reicheyt", uronilacetate and nitrate of lead contrasted on Reynolds. Preparations were investigated on the electronic microscope. Research results. The ultrastructure of liver of rats shows in a norm, that liver hepatocytes of rats had large kernels of the rounded or oval form with the wavy contours of nuclear shell (picture 1). Distribution of the condensed chromoplasm was premarginal on separate areas in a nucleoplasm. Karyonucleus is large, mainly granular structure. There were the single lipid including and lipofuscin granules. Space of Disse was filled by the numerous micrivillus of vascular surface of hepatocyte. Endothelia, covering the sinewaves of liver was presented by the layer of thin endothelial cages. The cages of Kupffer met rarely.

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Picture 1- Ultrastructure of hepatocyte in a norm. N - nucleus, M - mitochondria, GCR - granular cytoplasmic REticulum, G - is a glycogen. Electronogram x 12500 Electron-microscopic research of liver of rats after swimming showed the next ultrastructural changes related to certain physical activity. The nucleus of hepatocytes contained plenty of euchromatin. The condensed chromoplasm is distributed by the thin stroke of premarginal (picture 2). The amount of nuclear pores increased. Long tubulis of granular cytoplasmic reticulum was situated in close connection with a nucleus and mitochondria. In area of large blade mitochondrias they possessed narrow road clearances (picture 2).

Picture 2 - Ultrastructure of hepatocyte of rats after swimming. Hypertrophy of mitochondria. (M). Electronogram x 12 500 Thus, frequent - in a flow 30 minutes the conducted swimming at the temperature of water 18°C resulted in the expressed compensatory-adaptive reactions of organoids, reflecting strengthening of albuminous and carbohydrate synthesis in a liver. The destructive changes of organoids as a result of overstrain were expressed not sharply. Ultrastructure of liver of rats, being on an abundant high-calorie and balanced diet after 30 days of swimming showed that nucleus of hepatocytes had been by large with premarginal distribution of the condensed chromoplasm (picture3). Electronically dense granules and wall outlets of granules of glycogen were evenly situated in a cytoplasm. Lipid drops are polymorphic on a size possessed more dense core and electronic light rim. Thus, phenomena of fatty dystrophy of hepatocytes in liver saved. At electron microscopic study of liver of rats, being on the lowcalorie vitaminized diet in 30 days swimming it is found out that the nucleus of hepatocytes had the scalloped cut up contours of nuclear shell and premarginal distribution of the condensed chromoplasm (picture 4). Thus, in 30 days of swimming on a

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background this diet the brightly expressed compensatory adaptive changes developed in hepatocytes, reflecting intensification of proteins and carbohydrate exchange. The signs of fatty dystrophy were absent.

Picture 3 - L- lipid drops on periphery of hepatocyte, APL - autophagolysosome. Electronogram x 14 500

Picture 4 - Sharp hyperplasia of granular cytoplasmic reticulum (GCR) and mitochondria (M), G is a glycogen. The phenomena of fatty dystrophy are absent. Electronogram x 12 500 Conclusion. Electron microscopy research educed the presence of the expressed fatty dystrophy of hepatocytes for rats in 30 days of swimming a feed high-calorific food resulted in predominance of processes of accumulation of fat. Lipid drops became denser. The preliminary feed of rats and swimming the low-caloric vitaminized food the phenomenon of fatty dystrophy of hepatocytes did not cause. Ultrastructural changes of mitochondria, granular cytoplasmic reticulum, testified to the high level of compensatory-adaptive reactions. Intensification of exchange processes accompanied by the enhanceabledetoxication function of cages, provided agranular endoplasmic reticulum and peroxisomas. This diet exclusive development of fatty dystrophy of liver and high resistance of organ to physical stress.

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3.Б. Есимсиитова 1, А.С. Кожамжарова2, Р.Т.Тагирова2, С.А.Манкибаева1, Б.А.Абдуллаева1,И.А.Мырзаханова,2 Ж.С.Өскенбай1 1Әл-Фараби атындағы Қазақ Ұлттық Университеті 2С.Ж. Асфендияров атындағы Қазақ Ұлттық Медицина Университеті

ӘРТҮРЛІ ДИЕТАЛАРМЕН ФИЗИКАЛЫҚ ЖҮКТЕМЕНИҢ ЖОҒАРЫЛАУЫ ЖАҒДАЙЫНДАҒЫ ЕҒЕУҚҰЙРЫҚТАРДЫҢ БАУЫРЫНЫҢ УЛЬТРАҚҰРЫЛЫМЫ

Түйін: Бұл жұмыста егеуқұйрықтар гепатоциттерінің ультрақұрылымдарының мәліметтері келтірілген. Денеге физикалық күш түсіру және әр түрлі энергетикалық бағалығы бар толық тамақ рационын араластыру кезіндегі бауырдың морфологиялық көрсеткіштері зерттелді. Жоғары калориялық тамақ диетасындағы егеуқұйрықтарда гепатоциттердің май дистрофиясының айқын көрінуі, ал төмен калориялы дәруменделген тамақ диетасындағы егеуқұйрықтарда

гепатоциттердің май дистрофиясы құбылысының болмайтындығы көрсетілді. Түйінді сөздер: бауыр, дистрофия, гепатоциттер, диета, егеуқұйрықтар, майлар, көмірсулар, ультра құрылым.

З.Б. Есимсиитова¹, А.С. Кожамжарова², Р.Т.Тагирова², С.А.Манкибаева¹,
Б.А.Абдуллаева¹, И.А.Мырзаханова,² Ж.С.Өскенбай¹ 1Казахский Национальный университет имени
Аль-Фараби 2Казахский Национальный Медицинский Университет имени С.Д. Асфендиярова

УЛЬТРАСТРУКТУРА ПЕЧЕНИ КРЫС В УСЛОВИЯХ ПОВЫШЕННОЙ ФИЗИЧЕСКОЙ НАГРУЗКИ С РАЗЛИЧНОЙ ДИЕТОЙ

Резюме: В работе приводятся данные ультраструктуры гепатоцитов крыс. Исследовались морфологические показатели печени при комбинированном воздействии физической нагрузки и полноценного рациона питания с различной энергетической ценностью. Показано наличие выраженной жировой дистрофии гепатоцитов у крыс, находившихся на высококалорийной сбалансированной диете, а питание низкокалорийной витаминизированной пищей выявило отсутствие наблюдаемых явлений. Ключевые слова: печень, дистрофия, гепатоциты, диета, крысы, жиры, углеводы, ультраструктура.

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Z.B. Yessimsiitova¹, A.S. Kozhamzharova², N.T. Ablaykhanova¹, I.A. Zhuravel³, S.A. Mankibaeva¹,
P.Tleubekkyzy⁴, I.M. Zharkova¹ 1Al-Farabi Kazakh National University 2Asfendiyarov Kazakh National
Medical University 3Kharkiv Medical Academy of Postgraduate Education, Kharkov, Ukraine 4 Astana
Medical University

STUDY OF INFLUENCE OF TOXIC SUBSTANCES ON ORGANISM

In the article the questions of complex action of crude oil are shown on the whole on the organism of rats. Morphological, haematological processes are studied for mammals, developing under influence of action of crude oil, getting them with food and water in the conditions of laboratory experiment. It is set that enterosorbent possesses the expressed universal absorbent property. In the road clearance of gastrointestinal tract it can link and destroy from an organism acting from outside and appearing inwardly toxic substances of different nature, including oil products. Keywords: toxic substances, rats, morphological processes, haematological processes, enterosorbent, histological research, haematological index of blood, speed hemopexis, automatic haematological analyzer.

Introduction. Presently considerable part of illnesses of man and animals is related to worsening of ecological situation. Oil, getting in the organism of animals, can cause the gastroenteric bleeding, intoxication of liver, kidney insufficiency and violations of piosis. Presently from influence of environment

there is influence of enormous amount of toxic substances on the organism of man and animals. Toxic substances affect organism of people through respirable air, consumable food, water and through a skin. Under influence of toxic substances there are the pathological processes

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in organs, attended with the morphological changes of tissue their formative. Violation of structure of one of them affects functional and structural properties of other tissue systems, that results in certain violations of intertissuecooperations. Finding out of biological mechanisms of action of toxic substances at intercellular and intertissue level matters very much for understanding of pathogeny of different diseases. For renewal and defence of organism of man enterosorbents, able to take in, render harmless and destroy toxic connections from an organism, are widely used [1-10]. From literary data evidently, that small works on the study of morphological changes on a background the use of complex action of enterosorbent on the whole on the organism of man and animals. For normalization of the broken exchange processes in the organism of man and animals, caused by eco-toxicants of anthropogenic character, very much different facilities and methods offer, heavy metals, adsorbents, and forage additions. Effective means reducing the negative consequences of action of eco-toxicants on the organism of animals are enterosorbents. Enterosorbition practically does not have contra-indications, does not require the special equipment, applicable in any terms[1115]. Taking into account, importance of enterosorbents by us was high-efficiency carbon enterosorbents on the basis of digister, possessing a correction, universal sorbtion abilities, goes out an organism by a standard method. In this connection, we undertook a study on determination of effective influence of enterosorbents on the histological and haematological indexes of white outbred rats getting it with food and water in the conditions of laboratory experiment. Methods of realization of the experiment. Research object is 60 outbred rats-males of three months age with initial mass 200220 gramms. Rats were neat on sex, age, mass. The choice of males for a study was conditioned by that for females in the different terms of ex-trawl cycle a sensitiveness can change to the different factors, and also a hit is possible in experience of pregnant females. The animals selected for experience answered all requirements produced to raising of experiment (Good Laboratory nursery). 1 group is an intact group; 2 group is an experience group - poisoning of Tengiz deposits; 3 group is an experience group is poisoning by oil of Tengiz deposit + enterosorbent. Research is plugged in itself by influence of crude oil on shallow mammals in laboratory terms. Control group of animals got the same forage, in the same amounts and proportions, but without addition of oil. During an experiment in the food ration of experimental groups of animals got the same forage, in the same amounts and proportions, but without addition of oil. During an experiment in the food ration of experimental groups of animals systematic - added crude oil of Tengiz deposit. On the first stage of experiment a feed was mixed by oil in gravimetric correlation 1: 0,01 is a concentration of oil about 1%, the concentration of oil of 0,001% was created in a drinkingwater. Thus, taking into account day's ration of rat 2, 3 groups got crude oil in a dose- 6 g/kg/day. On the second stage of experiment animals 3 groups after poisoning by oil enterosorbent every day in the dosage of 1g/kg/day. Animals were contained in terms vivariums, by free availability to food, water and were one age. An experiment was conducted on standard to the generally accepted methodology. Viewing and photographing of the got histological preparations carried out through the light microscope of LeicaDMLS with the digital chamber of LeicaDFS 280. For determination of haematological indexes of blood (amount of haemoglobin, red cells, thrombocytes and leucocytes, and similarly speed and haemopexis) of used automatic haematological analyzer of Abacus Junior Vet, productions of DIATRON (Austria). Fence of blood for laboratory animals came true by the method of

counteretch for rats, approximately 0,5-0,6 mls of blood. Animals before a counteretch were put to sleep by a chloroform. Haematological researches. Haematological indexes of blood at petroleum contamination and after a correction in a winter

spring period it was shown by its enterosorbent, that during the repeated realization of experiment practically all haematological indexes of blood of animals of the second group fell down at petroleum contamination. For some animals of the second group leucopeny, relatively absolute lymphopenia and monocytosis were marked. Sharply fell down level of red corpuscles and haemoglobin, and also thrombocytes. Experimental data showed that the stay of rats on a petroleum diet had resulted in the considerable changes of leukocytes picture of peripheral blood. After the stay of rats on a petroleum diet there was statistically the reliable ($P < 0,001$) lowering of general amount of leucocytes to $1,6 \pm 0,02$ $10^9/l$. as compared to a control group are $4,9 \pm 0,03$ $10^9/l$. It is impossible to eliminate the origins of leucocytosis in our experiments and due to mobilization of cages from a wall pool in circulator. After disintoxication the amount of leucocytes increased to $5,1 \pm 0,01$, leukoformulenotedly got well. Experimental data showed that the stay of rats on a petroleum diet had resulted in the considerable changes of index of red corpuscles of peripheral blood. After the stay of rats there was statistically the reliable ($P < 0,001$) lowering of all indexes of index of red corpuscles on a petroleum diet, the amount of red corpuscles and haemoglobin is special to - $8,29 \pm 0,08$ and $89 \pm 3,5$ accordingly. After disintoxication the amount of red corpuscles and haemoglobin increased to - $8,97 \pm 0,07$ and $113 \pm 6,4$ accordingly, erythrocytes formulenotedly got well. These changes in the thrombocyte index of peripheral blood at petroleum contamination and after a correction it was shown by its enterosorbent, that the stay of rats on a petroleum diet had resulted in the considerable changes of index of red corpuscles of peripheral blood. After the stay of rats there was statistically the reliable ($P < 0,001$) lowering of some indexes of thrombocyte index on a petroleum diet, the amount of thrombocytes and thrombocyte is special to - $577 \pm 13,5$ and $0,351 \pm 0,002$ accordingly. After disintoxication the amount of thrombocytes and haemoglobin increased to - $680 \pm 8,2$ and $0,461 \pm 0,001$ accordingly, thrombocyte formula notedly got into norm. Experimental influence caused in the organism of shallow mammals of the second group noticeable deviations from a norm, and indexes of blood the animals of the third group had very near with the indexes of blood of control group of animals. It talks that enterosorbent as a purifier of organism from toxicants positively influences on the indexes of blood at chronic to intoxication. Consequently application of enterosorbent effectively reduces negative influence of oil on the homoeostasis of organism. Morphological researches. Results of histological research of lungs, heart, buds, bowels and stomach for the control rats of the first group on semithin cuts showed that all organs are in a norm. The results of histological research of lungs for the experimental rats of the second group after influence of crude oil were found out the expressed morphological changes. The phenomena of atelectasiss of pulmonary fabric are placed visible, alternating with the areas of swelling of pulmonary tissue. Microscopic research of myocardium of experimental rats of the second group showed an edema and destruction of separate endothelial cages. Of the circulatory system capillaries were sanguineous. Morphological researches of mucous membrane of thin department of bowels covered by a monolayer with a border epithelium with the unclearly expressed arctic differentiation of relatively basale membrane. There was a plethora of capillaries of hair and vessels of own shell in a thin bowel. The hypersecretion of bowel cells was also marked, that can be considered as a protective reaction. Histological research of bowels of rats at influence crude oil showed the expressed changes of destructive character in thin bowels and insignificant morphological changes of compernsatory-adaptive character in the thick department of bowels. Histological researches of action of crude oil on the stomach of rats educed pathomorphological changes in a structure, there was an edema of mucous membrane of stomach and violation of integrity of epithelium in the separate areas of stomach. As a result of histological study of organs of experimental rats of the third group after poisoning by nanoenterosorbent was visible oil of Tengiz deposit +, that morphological researches of action of enterosorbent on the stomach of rats did not educe strong changes in the structure of

this organ. On expiration of experiment after the reception of enterosorbent the stomach of rat looked fully renovated. Morphological research of kidneys of experimental rats of the third group showed that feeding by enterosorbent assisted the increase of compensatory-adaptive reactions. The histological study of microslides of myocardium of experimental rats of the third group showed on semithincuts, that in the muscular shell of heart of strong damages was not observed. As a result of histological research of bowels there is strengthening in the mucous membrane of shell of thin bowel by the bowel cells of hair secretion of mucus and selection of it in the road clearance of bowels, that executes a protective reaction on entering it road clearance of oil, the secretion of mucus increased bowel cages, its accumulation was marked in space between hair, also there are insignificant morphological changes in the thick department of bowels. Conclusion. Haematological indexes of blood the animals of the third group had very near with the indexes of blood of control group of animals. For the animals of control group and third group the signs of anaemia were not marked, it talks about that, enterosorbent as a purifier of organism from toxicants positively influencing on the indexes of blood during chronic intoxication. In the road clearance of gastrointestinal tract enterosorbent can link and destroy from an organism acting from outside and appearing inwardly toxic substances of different nature, including oil products, and also can sorb surplus of bilirubin, cholesterol and lipid complexes, metabolites of nitrous exchange, substances of "middle molecular mass", accountable for development of metabolic toxicosis. The results of histological research of internal organs specify on that after influence of crude oil the expressed morphological

changes come to light in lungs, heart, kidneys, bowels, stomach of animals. The obtained experimental data of the third group testify that at petroleum contamination and after a correction its enterosorbent during two months accompanied rats by reduction of damage of organs. Undertaken studies for the rats of the second group allowed to educe, that over feeding with of rats crude oil brings to strong destructive violations of organs of lungs, heart, kidneys, bowels, stomach, and application in the experiment of crude oil and after a correction assisted reduction of dystrophic processes and increase of compensatory-adaptive reactions. Conclusions: 1. Experimental influence crude oil caused in the organism of rats of the second group noticeable deviations from a norm. Adding of crude oil to the food ration resulted in the destructive changes of organs of animals of this group. Application of enterosorbent notably brought down negative influence of oil on morphological changes. 2. Enterosorbent can have antioxidant, blocks the action of aggressive free radicals and adaptogenic properties, promotes the resistibility of organism to the infections, unfavorable ecological factors, plays an important correction role. 3. The use of enterosorbent in experiment of the third group does not cause in the investigational organs of rats of the special changes of destructive character. Insignificant changes in histostructure fully reversable and carry compensatory-adaptive character. 4. It is set that enterosorbent possesses the expressed universal sorption property, renovates homoeostasis of organism and possesses compensatory-adaptive characteristics.

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3.Б.Есимсиитова¹, А.С.Кожамжарова², Н.Т.Аблайханова¹, И.А.Журавель³, С.А.Манкибаева¹, П.Тлеубеккызы⁴, И.М.Жаркова¹ 1Әл-Фараби атындағы Қазақ Ұлттық Университеті 2С.Ж. Асфендияров атындағы Қазақ Ұлттық Медицина Университеті 3Харьков медициналық жоғары оқу орнынан кейінгі білім беру академиясы, Харьков, Украина 4Астана Медицина Университеті УЫТТЫ ЗАТТАРДЫҢ АҒЗАҒА ӘСЕРІН АНЫҚТАУ Түйін: Мақалада, егеуқұйрық ағзасына мұнай шикізатының кешенді әсерінің жалпы сұрақтары қарастырылғандығы көрсетіледі. Зертханалық тәжірибелер барысында,сүтқоректілерді қоректендіру негізінде тағаммен және сумен келетін мұнай шикізатының әрекетінің әсерінен болатын морфологиялық, гематологиялық процестер анықталынды.Энтеросорбент әмбебап сорбциялық қасиеттерге ие екендігі анықталынып құрылды. Ағзадан және сырттан келіп түскен сондай - ақ іште пайда болған түрлі табиғатты уытты заттарды және мұнай өнімдерін саңылауда асқазан-ішек трактының байланыстыруы мүмкін. Түйінді сөздер: уытты заттар, егеуқұйрықтар, морфологиялық процестер, гематологиялық процестер, энтеросорбент, гистологиялық зерттеу, қанның гематологиялық көрсеткіші, қанның ағу жылдамдығы, автоматтандырылған гематологиялық анализатор.

3.Б.Есимсиитова ¹, А.С.Кожамжарова², Н.Т.Аблайханова¹, И.А.Журавель³, С.А.Манкибаева¹, П.Тлеубеккызы⁴, И.М.Жаркова¹ 1 Казахский Национальный Университет имени аль-Фараби 2Казахский Национальный Медицинский Университет имени С.Д. Асфендиярова 3 Харьковская

ИЗУЧЕНИЕ ВЛИЯНИЯ ТОКСИЧЕСКИХ ВЕЩЕСТВ НА ОРГАНИЗМ

Резюме: В статье показаны вопросы комплексного действия сырой нефти в целом на организм крыс. Изучены морфологические, гематологические процессы у млекопитающих, развивающихся под влиянием действия сырой нефти, получавших ее с пищей и водой в условиях лабораторного эксперимента. Установлено, что энтеросорбент обладает выраженным универсальным сорбционным свойством. В просвете желудочно-кишечного тракта он может связывать и выводить из организма поступающие извне и образующиеся внутри токсические вещества различной природы, в том числе нефтепродуктов. Ключевые слова: токсические вещества, крысы, морфологические процессы, гематологические процессы, энтеросорбент, гистологическое исследование, гематологический показатель крови, скорость свертывания крови