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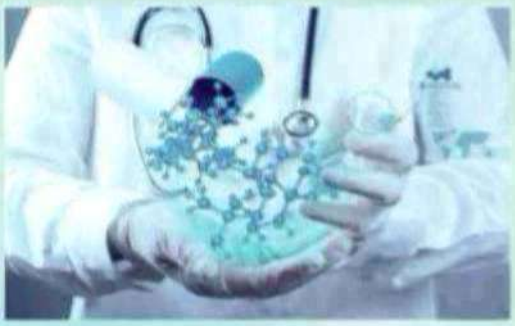

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NEW DAY IN MEDICINE

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METHODS OF INVESTIGATING SPECIFIC ASPECTS OF SPLEEN MORPHOMETRIC PARAMETERS IN EXPERIMENTAL BREAST CANCER CHEMOTHERAPY

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✓ ***Resume***

Purpose of the work. The aim of the study is to study the normal structure of the spleen of rats and its morphometric indicators and biochemical aspects in the pathology of the spleen and its correction in chemotherapy (for example: cisplatin, paclitaxel and doxorubicin).

Spleen (lien) is a parenchymal organ that performs immune, hematopoietic functions, participates in metabolism, in particular, iron and protein exchange. Like lymph nodes, it is an organ of lymphoid hematopoiesis and a biological filter. It is an organ that has the ability to change its size. The spleen, by reducing blood loss, increases the total amount of blood in the circulatory system, and in particular in ruminants and horses, it becomes a blood reservoir. This is the destruction of blood cells, mainly erythrocytes, which are ending their life, which is called the "erythrocyte graveyard". The breakdown products of red blood cells, in particular iron and oxygen, are recycled in the body.

During embryonic life, the spleen serves as an organ of myeloid hematopoiesis. It also has the ability to produce, that is, it serves as a place where lymphocytes that are appropriately identified by antigens present in the blood can develop into immunologically competent cells. In most postnatal animals, the normal spleen is a hematopoietic organ that produces lymphoid, erythrocyte and granulocyte lineages, megakaryocytes, and cells.

Keywords. spleen, morphometric indicators, biochemical aspects, chemotherapy.

МЕТОДЫ ИССЛЕДОВАНИЯ ОСОБЕННОСТЕЙ МОРФОМЕТРИЧЕСКИХ ПАРАМЕТРОВ СЕЛЕЗЕНКИ ПРИ ЭКСПЕРИМЕНТАЛЬНОЙ ХИМИОТЕРАПИИ РАКА МОЛОЧНОЙ ЖЕЛЕЗЫ

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✓ ***Резюме***

Цель работы. Целью исследования является изучение нормальной структуры селезенки крыс и ее морфометрических показателей, а также биохимических аспектов при патологии селезенки и ее коррекции при химиотерапии (на примере: цисплатин, паклитаксел и доксорубицин).

Селезенка — паренхиматозный орган, выполняющий иммунную, кроветворную функции, участвующий в обмене веществ, в частности, в обмене железа и белков. Как и лимфатические узлы, он является органом лимфоидного кроветворения и биологическим фильтром. Это орган, способный изменять свой размер. Селезенка, уменьшая кровопотерю, увеличивает общее количество крови в кровеносной системе, и, в частности, у жвачных животных и лошадей она становится резервуаром крови. Это разрушение клеток крови, в основном эритроцитов, которые заканчивают свою жизнь, что называется «кладбищем эритроцитов». Продукты распада эритроцитов, в частности железо и кислород, перерабатываются в организме.

В эмбриональном периоде селезенка служит органом миелоидного кроветворения. Он также обладает способностью к продукции, то есть служит местом, где лимфоциты, соответствующим образом идентифицированные антигенами, присутствующими в крови, могут развиваться в иммунологически компетентные клетки. У большинства постнатальных животных нормальная селезенка представляет собой кроветворный орган, который продуцирует лимфоидные, эритроцитарные и гранулоцитарные линии, мегакариоциты и клетки.

Ключевые слова. селезенка, морфометрические показатели, биохимические аспекты, химиотерапия.

TAJRIBADAGI SUT BEZI RAKI KIMYoTERAPIYaSIDA TALOQ MORFOMETRIK KO‘RSATKIChLARINING O‘ZIGA XOS JIHATLARINI TEKShIRISh USULLARI

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✓ ***Rezyume***

Taloq (lien) - immun, gematopoetik funktsiyalarni bajaradigan, metabolizmda, xususan, temir va oqsil almashinuvida ishtirok etadigan parenximal organ. Limfa tugunlari singari, u limfoid gematopoezning organi va biologik filtrdir. Bu o'z hajmini o'zgartirish qobiliyatiga ega bo'lgan organ. Taloq qon yo'qotishni kamaytirib, qon aylanish tizimidagi qonning umumiy miqdorini oshiradi, ayniqsa kavsh qaytaruvchi hayvonlar va otlarda qon omboriga aylanadi. Bu qon hujayralarini, asosan, eritrotsitlarni yo'q qilish bo'lib, ular o'z hayotini tugatmoqda, bu "eritrositlar qabristoni" deb ataladi. Qizil qon hujayralarining parchalanish mahsulotlari, xususan, temir va kislorod tanada qayta ishlanadi.

Embrion hayot davomida taloq miyeloid gematopoezning organi bo'lib xizmat qiladi. Shuningdek, u ishlab chiqarish qobiliyatiga ega, ya'ni qonda mavjud bo'lgan antijenler tomonidan mos ravishda aniqlangan limfotsitlar immunologik jihatdan vakolatli hujayralarga aylanishi mumkin bo'lgan joy bo'lib xizmat qiladi. Postnatal hayvonlarning ko'pchiligida oddiy taloq qon hosil qiluvchi organ bo'lib, limfoid, eritrotsitlar va granulotsitlar, megakaryotsitlar va hujayralarni hosil qiladi.

Ishning maqsadi. Tadqiqotning maqsadi kalamushlar taloqining normal tuzilishi va uning morfometrik ko'rsatkichlari va taloq patologiyasida biokimyoviy jihatlarini o'rganish va uni kimyoterapiyada tuzatish (masalan: sisplatin, paklitaksel va doksorubitsin).

Kalit so'zlar. taloq, morfometrik ko'rsatkichlar, biokimyoviy jihatlar, kimyoterapiya.

Relevance

In humans, the spleen traditionally performs this function only in the fetus, but it retains the ability to produce cells even in adults. Under certain pathological conditions, the spleen can also produce cells that are normally produced in the bone marrow. (Aldayarov N.S. and others 2008; Shapk Yu.G., 2009; Zavaleeva S.M., Sizova E.A., Chirkova E.N., 2010; Fedorovskaya N.S., 2011; Kourilsky P., Truffa-Bachi R. (2001); Smith Kevin G, Hunt John, 2004; Lee Z., 2012). There are many incoming macrophages in the circulating blood volume. Their main task is to phagocytize old erythrocytes, as well as leukocytes and platelets. A large part of the iron released by macrophages from the hemoglobin of phagocytized erythrocytes is directed to the bloodstream. This iron is reused in the bone marrow to produce new red blood cells. In addition, macrophages of the spleen produce the pigment bilirubin from the broken down hemoglobin. It passes to the liver, where it becomes a component of bile (Shapkin Yu.G., Maslyakov V.V., 2009;). It is known that the spleen is not of vital importance, but it belongs to the peripheral lymphoid tissues.

Cancer diseases associated with damage to the spleen during chemotherapy are one of the most pressing problems in the field of oncology. In most cases, damage to the spleen, which is known to predict the patient's condition during chemotherapy in cancer, can lead to a profound change in the immune system.

Anticancer therapy should be accompanied by appropriate evaluation and management, even in patients with acute splenic injury due to cancer. As acute splenic injury progresses to chronic splenic disease, these patients need a systematic and balanced approach. In the context of tumor-related diseases, successful prevention and treatment are aimed at preserving the function of the spleen, as well as improving the quality of life processes (Campbell G.A, Okusa M.D-14).

The purpose of the study:

1) to scientifically evaluate the morphological and biochemical parameters of the rat and its spleen in the norm;

2) to evaluate the morphological parameters and cellular structural changes of the rat and its spleen after the introduction of chemical agents;

3) to practically evaluate the biochemical parameters of the spleen when corrected with pomegranate seed oil in several ways during the experiment and analyze the relationship between them and morphometric parameters;

4) to determine the general patterns of the morphology of the components of the spleen tissue during chemotherapy, and the specific features of its biochemical parameters.

Material and methods

Experiments were conducted on 250 white female outbred rats born in vivarium conditions. 6-month-old rats were involved in it. In the experiments, the ethical rules for the use of animals and the requirements of the Helsinki Congress were observed. Before the start of the experiments, all sexually mature rats were quarantined for one week and, after excluding somatic or infectious diseases, they were transferred to a vivarium under the same conditions as usual. During the experiment, the behavior and physiological state of animals in the control and experimental groups were monitored. The rats were divided into 13 groups (n = 250): control group I (n = 40); groups 2-13 (n = 210) - experimental animals were exposed to 7,12-dimethylbenzanthracen carcinogen to induce mammary cancer in the experimental groups. The tumor marker CA-15-3 (Cancer Antigen 15-3) was determined in the blood. A 68.9% success rate was achieved, i.e., 145 mice were treated with 7,12-dimethylbenzanthracene, a mammary carcinogen, at a dose of 0.1 mg subcutaneously in the mammary gland of 210 female rats. Rat mammary cancer was called. After that, we divided 145 outbred white female rats with mammary gland cancer into 12 more groups. In group 2 (n = 12), rats with cancer were treated with paclitaxel intravenously at a dose of 0.2 mg/kg and gastric metal intragastrically for 21 days. 0.7 ml of distilled water was introduced through the probe; Group 3 (n = 12) received cisplatin intravenously and intragastrically by gastric metal gavage at a dose of 0.4 mg/kg to cancer rats for 21 days. during which 0.7 ml of distilled water was added; Group 4 (n=12) treated cancer rats with a combination of cisplatin at a dose of 0.4 mg/kg intravenously and paclitaxel at a dose of 0.2 mg/kg and intragastric 0.7 ml of distilled water was injected through a stomach metal probe for 21 days; Group 5 (n=12) cancer-bearing rats were administered paclitaxel intravenously at a dose of 0.2 mg/kg and thymalin intramuscularly at a dose of 0.01 mg/day for 7 days; Group 6 (n=12) cancer-bearing rats were administered cisplatin intravenously at a dose of 0.4 mg/kg and thymalin intramuscularly at a dose of 0.01 mg/day for 7 days; Group 7 (n = 12) cancer rats received intravenous cisplatin at a dose of 0.4 mg/kg and paclitaxel at a dose of 0.2 mg/kg for 7 days. thymalin at a dose of 0.01 mg per day was administered as an intramuscular injection; Group 8 (n=12) experimental animals treated cancer rats with 0.2 mg/kg paclitaxel intravenously and intragastrically 0.7 ml of pomegranate seed oil was injected through a metal probe for 21 days; Group 9 (n=12) cancer rats were treated with cisplatin 0.4 mg/kg intravenously and intragastrically by gastric metal gavage for 21 days. 0.7 ml of pomegranate seed oil was added; Group 10 (n=12) treated cancer rats with intravenous cisplatin at a dose of 0.4 mg/kg and paclitaxel at a dose of 0.2 mg/kg and intragastrically for 21 days. 0.7 ml of pomegranate seed oil was injected through a gastric metal probe; Group 11 (n=12) cancer-bearing rats were administered paclitaxel intravenously at a dose of 0.2 mg/kg and pomegranate seed oil (0.7 ml) intragastrically via a metal gastric tube for 21 days, and thymalin (0.01 mg/day) intramuscularly for 7 days; Group 12 (n=12) cancer-bearing rats were administered cisplatin intravenously at a dose of 0.4 mg/kg and pomegranate seed oil in a volume of 0.7 ml via an intragastric metal tube for 21 days, and thymalin in a dose of 0.01 mg per day for 7 days as an intramuscular injection; Group 13 (n=12) treated cancer rats with a combination of cisplatin at a dose of 0.4 mg/kg intravenously and paclitaxel at a dose of 0.2 mg/kg and intragastric 0.7 ml of pomegranate

seed oil for 21 days and 0.01 mg of thymalin per day for 7 days as an intramuscular injection were administered through a gastric metal probe.

Analysis of individual results:

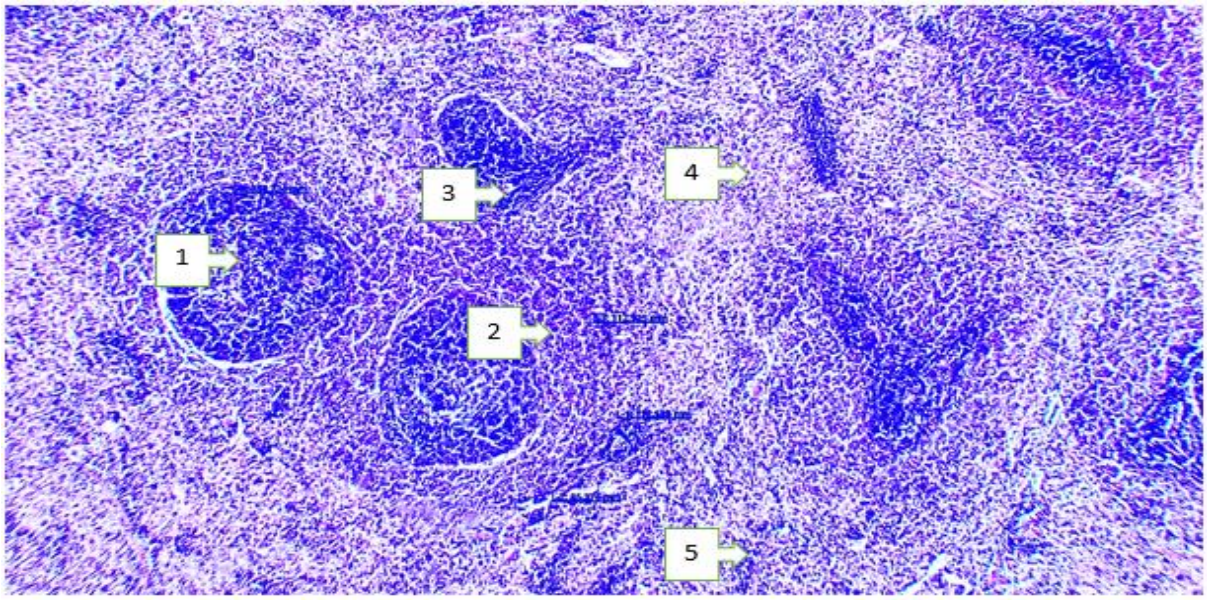

Figure 1. Morphometric appearance of the spleen of a normal 5-month-old white mouse. Staining G-E.ob 4x20 ok.

The white pulp area of the spleen is the central part of the lymphoid follicle - the proliferative and reactive center, rich in B lymphocytes (1). The mantle and marginal zone in the atrophied central part are wide in size (2). The periarteriolar (central arteriole) lymphatic layer is rich in T lymphocytes (3). Spleen red pulp area: the wall of the sinusoids is strong, the cavity is wide, rich in blood (4). Splenic bands are broad, rich in long B lymphocytes and plasma cells (5).

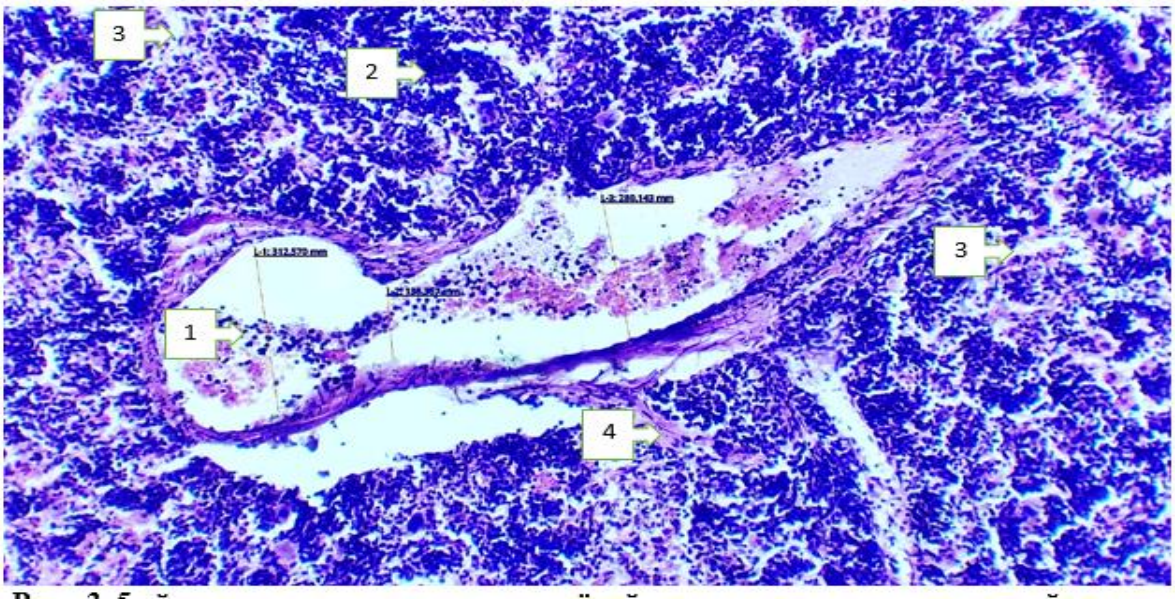

Figure 2. Morphometric appearance of the spleen after the introduction of chemicals into a 5-month-old white mongrel. Staining G-E.ob 4x20 ok.

Splenic blood vessels are dilated, stasis, and the lumen is enlarged, and the walls are thickened (1). Splenic red pulp area: splenic cords (chordae lienalis) are reduced, hyperchromic, and young B-lymphocytes are increased (2). Splenic sinusoids (sinus lienalis) cavity is wide, scattered erythrocyte fragmentation (3). Splenic trabeculae appear enlarged and thickened (4).

The spleen is one of the peripheral organs of the body's immune defense system. The spleen performs several important functions in the body:

1. Immune defense function. The spleen participates in cellular and humoral immunity due to the high proliferation of T and B lymphocytes in the spleen and their interaction with the cells of the microenvironment.
2. Hematopoietic function. During embryonic development, granulocytes, erythrocytes, and platelets are formed in the spleen. However, this unique process stops with the birth of the embryo.
3. It breaks down erythrocytes that have reached the end of their life span. Hemoglobin, which is formed from the breakdown of erythrocytes, releases iron-storing transferrin and bilirubin. Bilirubin travels through the blood to the liver and is added to the bile. Transferrin is involved in the hemoglobin synthesis of newly formed erythrocytes that travel to the bone marrow.
4. Actively participates in the process of erythropoiesis and thrombocytopoiesis.
5. The spleen is a reserve source of blood - a certain amount of blood is stored in the spleen and is released into the circulatory system when necessary

Conclusion

Chemotherapy in breast cancer patients affected all parameters of the spleen structure. Corrected with pomegranate seeds, the experimental width and organometric morphological parameters (length and volume and volume) increased.

During breast cancer chemotherapy, significant changes were observed mainly in absolute weight of the spleen, size, diameter of blood vessels, their surface, and in the cells of the spleen.

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