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EFFECTIVENESS OF DIET IN EXPERIMENTAL CHRONIC KIDNEY DISEASE

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Summary. Among the important socio-economically important problems, a special place is occupied by kidney diseases. Timely identification of individuals and patients at high risk of developing chronic kidney disease in the early stages of the disease, risk factors, and adequate treatment methods can stop the growth of renal dysfunction. It should be noted that the effectiveness and safety of a low-protein diet have a good evidence base. The aim of the study was to substantiate the safety and efficacy of a diet consisting of bakery products made from wheat / soy flour, based on morphological studies in rats with chronic kidney disease (glomerulonephritis). The experiments were conducted on 24 white male rats with a body weight of 250-300 g. Modeling of glomerulonephritis was caused by the introduction of adaptive lymphocytes. Group 1 comprised intact animals, group 2 — rats with glomerulonephritis contained in a normal diet (without the addition of bakery products from soy flour), group 3 included rats with glomerulonephritis, contained in the diet containing bread and bakery products from 5% soya flour, and group 4 - in the diet of bakery products from 10% soy flour. The organs and tissues of animals were examined histologically 60 days after glomerulonephritis modeling. The inclusion of bakery products made with 5% and 10% soy flour in rats with experimental glomerulonephritis has been proven safe. The histomorphological picture of the kidneys of rats of 3- and 4-experimental groups, consuming bakery products of 5 and 10% soy flour, was characterized by less pronounced lymphocytic infiltration in the renal interstitium, with fewer atrophic renal tubules compared with the control group. The cessation of sclerotic changes in the renal parenchyma was noted. Dystrophic changes in all studied organs were reduced, which was manifested in an improvement in the functional state of cell organelles, and a decrease in edema of the intercellular tissue.

Keywords: soy flour, bakery products, white rats, glomerulonephritis, histomorphological indicators.

Relevance. At the turn of the 20th and 21st centuries, the world community was faced with a global problem that was not only of medical, but also of great socio-economic importance - the pandemic of chronic noncommunicable diseases, which claimed millions of lives each year, leading to serious complications associated with disability and the need for high-cost treatment. Among them, kidney diseases occupy an important place due to the significant prevalence in the population, a sharp decrease in the quality of life, high mortality of patients and lead to the need for expensive substitution therapy in the terminal stage - dialysis and kidney transplantation [National recommendations. Chronic kidney disease: the basic principles of screening, diagnosis, prevention and treatment approaches [6]. Data from epidemiological studies conducted in the USA and Europe suggest that the prevalence of CKD in the world is currently at least 5%. Given the progressive course of most kidney diseases, an increase in the incidence of diabetes mellitus and cardiovascular diseases, which today are the main cause of the development of CKD and terminal renal failure (ESRD), the high cost of renal replacement therapy, CKD is a significant socio-economic problem in both developed and and in developing countries. Chronic kidney disease (CKD) is diagnosed based on anatomical or structural damage to the kidneys (albuminuria / proteinuria, changes in urine sediment, signs of kidney pathology during instrumental examination) and / or a decrease in glomerular filtration rate (GFR) <60 ml / min / 1.73 m2 that can be traced for 3 or more months, regardless of its nature and etiology [5]. The problem of CKD and its associated cardiovascular risk is currently one of the most relevant topics of nephrology, cardiology and endocrinology, stimulating research in related fields and contributing to the birth of new medical specialties. Only timely identification of individuals with a high risk of developing CKD and patients at its early stages, exposure to modifiable risk factors and adequate nephro- and cardioprotective therapy with the participation of specialists in various fields will stop the growth of the population of patients with renal dysfunction and reduce the need for renal replacement therapy [2]. The prevalence of CKD in the world is 12-18% and is comparable with socially significant diseases such as essential hypertension and diabetes mellitus, obesity and metabolic syndrome. Prevalence rates were obtained both in industrialized countries with high living standards and in developing countries with middle and low incomes. The prevalence of CKD stage 1-5 in the USA in adults reaches 15%. [3,4], in European countries (Netherlands, Norway, Spain, Australia) - 12-17%, in Japan - 18.7%; Congo - 12.4%, China - 14%. CKD is observed in more than 1/3 of patients with chronic heart failure, in 36% of people over the age of 60 years and in 16% of people of working age. The prevalence of CKD is slightly higher in women than in men (12.6% versus 9.7%) [1]. By age, CKD is more common among people aged ≥ 60 years (39.4%) than from 40 to 59 years (12.6%) or from 20 to 39 years (8.5%). CKD is detected in 5% of adults under 52 years of age compared with 68% in people over 81 years of age [7]. In terms of education, CKD is more common among people without secondary education (22.1%) than among people with secondary and higher education (15.7%). Overweight, obesity, abdominal obesity are independent risk factors for the development and progression of CKD. The most effective method for correcting the metabolic syndrome is weight loss. You should strive to achieve a body mass index (BMI). Of particular importance in CKD is the tight control of salt intake. More than 140 years ago, it was shown that limiting protein intake facilitates the condition of patients with impaired renal function. The effectiveness and safety of a low protein diet has a good evidence base. A meta-analysis (Fouque D. and Laville M., 2009) of RCTs, including 2,000 patients with CKD with an assessment of hard endpoints, showed that a low-protein diet in patients with CKD without diabetes prolongs kidney survival. The purpose of the

study was to substantiate the safety and effectiveness of the use of a diet with bakery products made from wheat / soy flour in rats with chronic kidney disease (glomerulonephritis) from the biochemical parameters of blood and urine.

Objects of study – histomorphological indicators of the kidneys of experimental animals with glomerulonephritis, who took and did not take complementary foods based on bakery products from wheat / soy flour.

Materials and research methods. The experiment was carried out on 24 sexually mature white male rats with an initial body weight of 250-300 g, kept under conditions of TMA vivarium. All experimental and control animals were in the same vivarium conditions on a regular and special diet. Throughout the experiment, animals were monitored daily; recorded the general condition, behavior, consumption of feed and water, the condition of the hair integument and mucous membranes.

Modeling of glomerulonephritis in white rats. Before the experiment, in all rats weighing 250-300 g under nembutal anesthesia (40 mg / kg body weight, intraperitoneally), the anterior abdominal wall is opened, the left kidney is isolated, and 250 pathogenic units of E are punctured directly into the kidney parenchyma. coli in a volume of 0.25 ml in isotonic solution. The wound is sutured tightly. Animals that are sexually anesthetized are killed on the 7th day during an experimental pathology. After rat slaughter under sterile conditions, the mesenteric lymph nodes are removed and placed in tissue culture medium No. 199. Nodes are separated from fatty tissue. Then the organs are ground in a glass homogenizer and passed through a nylon filter. Cell suspensions are washed twice by centrifugation at 1000 rpm. for 10 minutes. In the Goryaev chamber, the number of cells per ml of suspension is counted. Isolated lymphocytes (adapted lymphocytes) are administered to intact animals intravenously (through the tail vein) at a dose of 5 million per animal. Characteristic for glomerulonephritis signs will begin to appear on the 4th day after the introduction of adoptive lymphocytes. On the 5th day after the administration of adoptive lymphocytes, white rats were divided into 4 groups (1-intact; 2-with glomerulonephritis on a normal diet; 3-with glomerulonephritis on a diet with bread with 5% soy flour; 4-with glomerulonephritis on a diet with the addition of bread with 10% soy flour), 6 rats each. The first group of rats with glomerulonephritis was fed with a normal diet and left for observation. The second, third and fourth group of rats were given three meals a day with 5% and 10% soy flour, respectively.

Research results. Histological studies of organs and tissues of animals of 3 experimental groups were carried out 60 days after modeling glomerulonephritis. Animals of group 1 were given bakery products without the addition of soy flour. Animals of the 2nd group were fed three times a day with bakery products containing 5% of soy flour, animals of the 3rd group were fed with bakery products containing 10% of soy flour.

The histological diagnosis of the 1st experimental group made it possible to establish chronic tubulointerstitial nephritis (ChTIN) with focal nephrosclerosis (indicated by an arrow). Macroscopically, the kidneys are enlarged due to interstitial edema and inflammation, the border between the cortical and brain layers is not noticeable. Under the capsule and in the cortical layer - petechial hemorrhages. The tissue of the renal parenchyma is sometimes replaced and squeezed by focal growths of connective tissue (Fig. 1). Periglomerular and peritubular types of sclerosis prevail (indicated by a double arrow). The glomeruli of the cortical layer outside the zones of interstitial sclerosis are enlarged (Fig. 2).

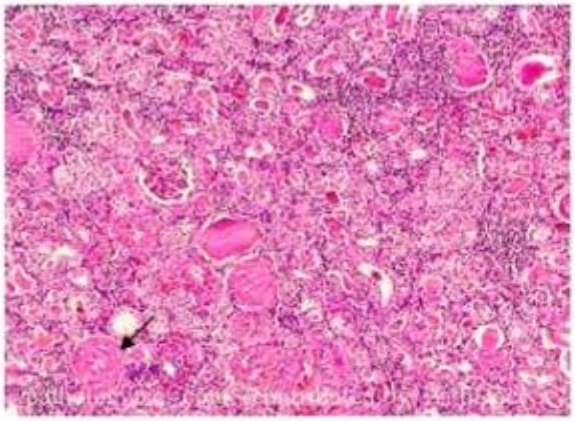

Fig 1. Kidney of a rat of group 1 after modeling glomerulonephritis using adapted lymphocytes on the 60th day. Coloring GE. Magnification. 10x10.

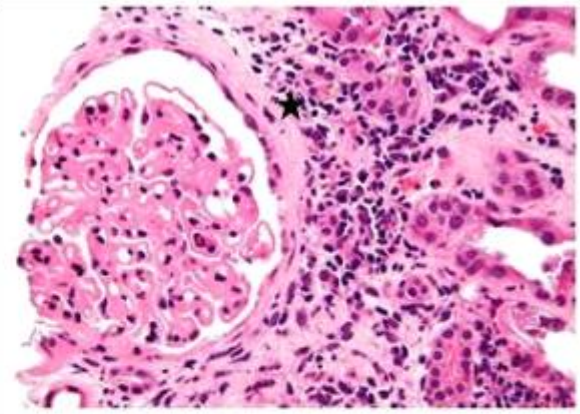

Figure 2. Kidney of a rat of group 1 after modeling glomerulonephritis using adapted lymphocytes on day 60. Coloring GE. Magnification. 10x20.

The results of morphological studies of the liver of the same group: macroscopically, the liver is enlarged, dark red and brown. On the histological sections revealed hemostasis in the capillaries, the expansion of sinusoids and Disse spaces, the accumulation of blood cells in them. In the periportal areas, lymphocytic infiltrates are detected (Fig. 3- indicated by an arrow). Hepatocytes have the correct multifaceted shape. The nuclei in some hepatocytes are weakly stained (hypochromic) or are not detected by examination under a light microscope. When cytological examination of the endothelium of the capillary of the hepatic lobules has gaps, in sinusoids and Disse spaces there are accumulations of shaped elements and proteins. In hepatocytes, signs of granular dystrophy are detected. Areas of fatty degeneration with enlarged and enlarged hepatocytes with the content of fat droplets are noted (a double arrow is indicated in Fig. 4).

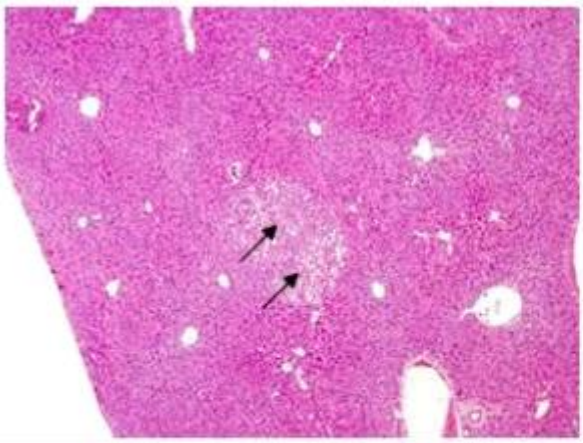

Fig. 3. The liver of a rat of group 1 after modeling glomerulonephritis using adapted lymphocytes on day 60. Coloring GE. Magnification. 10x10.

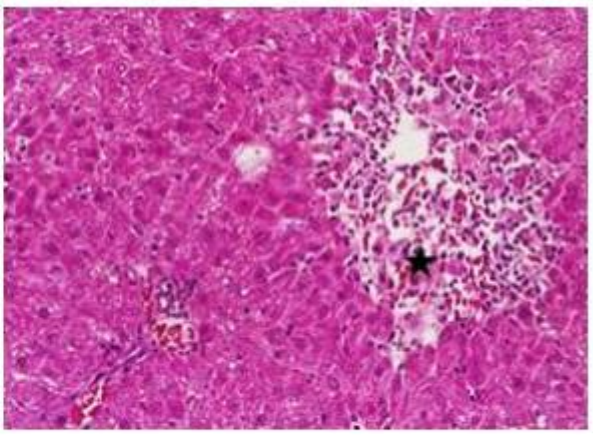

Fig. 4. Rat liver after modeling glomerulonephritis using adapted lymphocytes on day 60. Coloring GE. Magnification. 10x20.

Histological examination of spleen preparations in the first group of white rats showed pronounced splenomegaly. On the preparation, red pulp occupies 75% of the cut area, in it there are a variety of uniform blood elements. Secondary follicles appear. The

follicular pattern is clearly pronounced (indicated by the arrow in Fig. 5). White pulp is represented by a periarterial lymphatic vagina around the pulp artery, in which there is a T-lymphocytic reproduction center without mitosis (indicated by a double arrow). The white pulp contains a large number of small lymphocytes, a decrease in blast cells, and the accumulation of macrophages and plasma cells (Fig. 6).

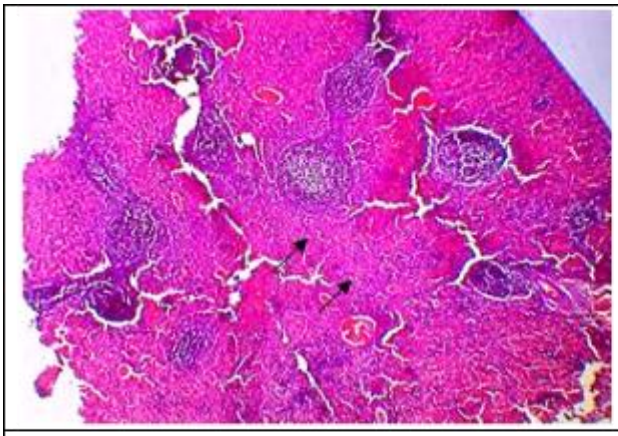

Fig. 5. Red pulp with clearly defined lymphoid follicles of white rats of group 1, after modeling glomerulonephritis with adapted lymphocytes on day 60. Coloring GE. Magnification. 10x20.

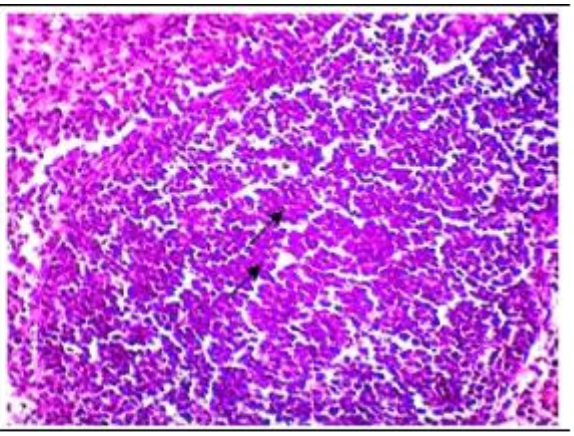

Fig. 6. White pulp of rats of group 1 with lymphocytes and single macrophages, after modeling glomerulonephritis using adapted lymphocytes on day 60. Coloring GE. Magnification. 10x40.

Morphological studies of the kidneys of animals of the 2nd experimental group, which were fed with bakery products containing 5% soy flour, showed less pronounced lymphocytic infiltration in the renal interstitium and interstitial edema was observed in only two micropreparations. A small amount of atrophied renal tubules is noted. Compared with the first group of the studied animals, under the capsule and in the cortical layer - petechial hemorrhages are not observed. The tissue of the renal parenchyma is less replaced by proliferation of connective tissue compared with the first experimental group (Fig. 7). A small number of glomerular sclerosis is observed (indicated by an arrow in Fig. 8).

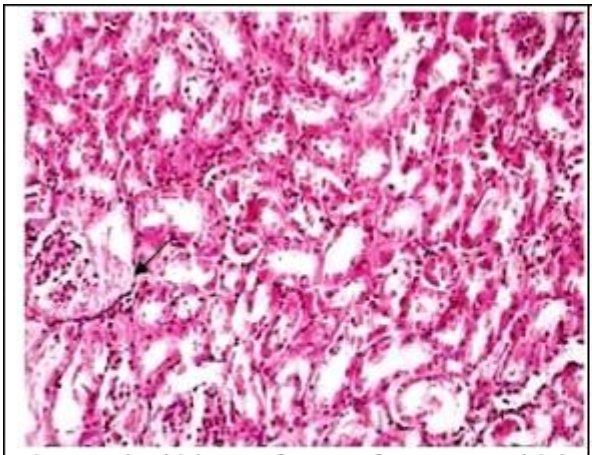

Fig. 7. The kidney of a rat of group 2, which took 5% soy flour for 60 days. Coloring GE. Magnification. 10x20.

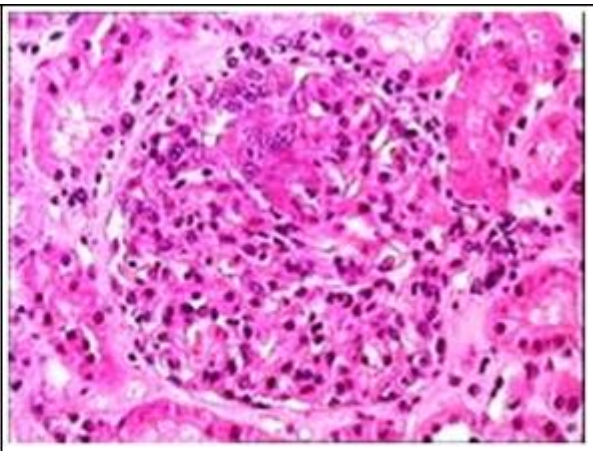

Fig. 8. Kidney of a rat of group 2, which took 5% soy flour for 60 days. Coloring GE. Magnification. 10x20.

Macroscopic examination of the liver of animals of the 2nd group with vacuole and hydropic dystrophies revealed a slight increase in organ size. The consistency of the liver is flabby, the color is dun. Histological examination of drugs stained with hematoxylin and eosin showed the following. Hepatocytes located mainly in the central zones of the hepatic lobules are enlarged (indicated by the arrow). Their cytoplasm is paler compared to unchanged hepatocytes due to the presence of vacuoles in it, filled with liquid ("balloon" dystrophy). The remains of a weakly eosinophilic granular cytoplasm were located clumps around the nuclei or along the cell membranes (Figs. 9 and 10).

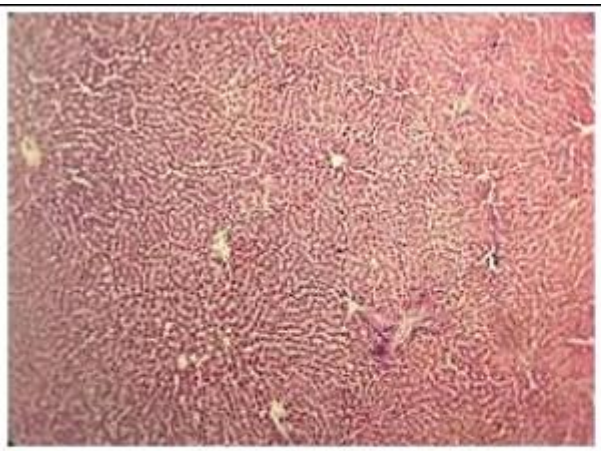

Fig. 9. Liver of a rat of group 2, which took 5% soy flour for 60 days. Coloring GE. Magnification. 10x10.

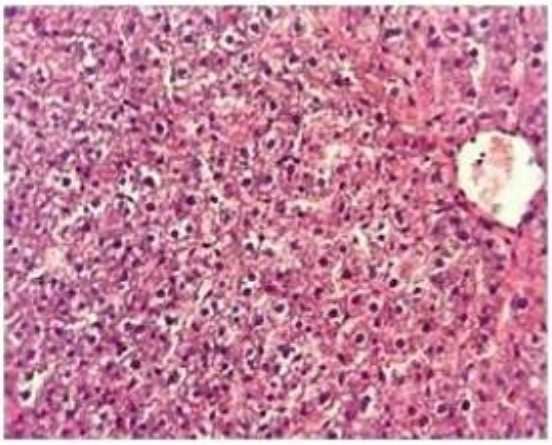

Fig. 10. Liver of a rat of group 2, which took 5% soy flour for 60 days. Coloring GE. Magnification. 10x20.

Morphological characteristics of the spleen of animals of the 2nd group without pathological changes, surrounded by a connective tissue capsule, which contains a small number of smooth muscle cells. Connective tissue trabeculae depart from the capsule into the parenchyma, which gradually become thinner as they deepen into the organ parenchyma. Some trabeculae contain muscular trabecular arteries. The spleen parenchyma of rats is quite clearly divided into white and red pulp. White pulp is represented by follicles (indicated by the arrow in Fig. 11). Red pulp makes up about 80% of the spleen parenchyma. It mainly consisted of pulp vessels of various calibres and hemocapillaries of the sinusoid type. Between the vessels, islands of lymphoid tissue of various sizes and shapes were located (indicated by a double arrow in Fig. 12).

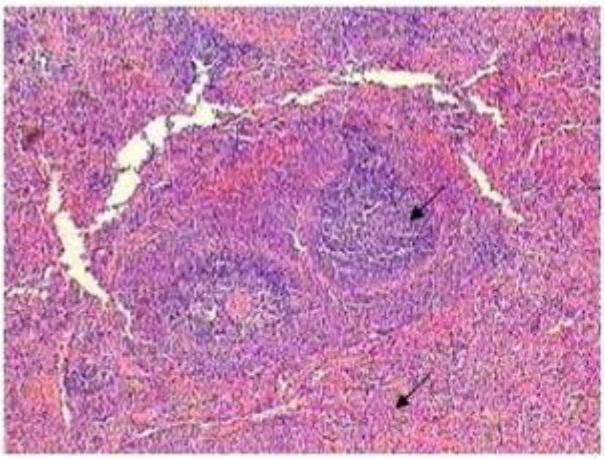

Fig. 11. The spleen of rats of group 2, after modeling glomerulonephritis using adapted lymphocytes, taking 5% soy flour for 60 days. Coloring GE. Magnification. 10x10.

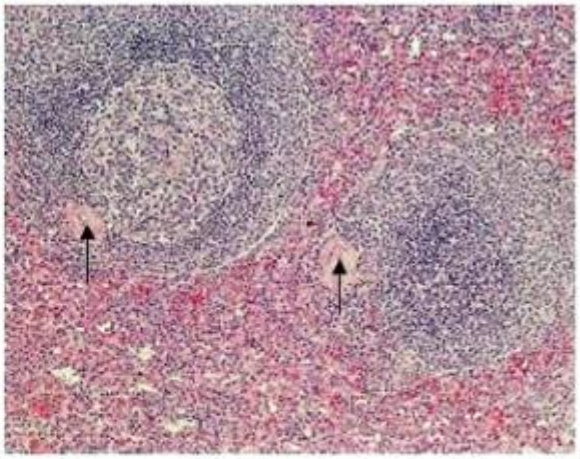

Fig. 12. The spleen of rats of group 2, after modeling glomerulonephritis using adapted lymphocytes, taking 5% soy flour for 60 days. Coloring GE. Magnification. 10x20.

A histological examination of the kidney preparations of rats of the 2nd experimental group revealed the uneven distribution of pathological changes of an inflammatory-dystrophic nature. On preparations stained with hematoxylin and eosin, hemodynamic changes were detected in the form of stagnant phenomena, which were manifested by a sharp expansion of interlobular arterioles and capillaries, by aggregation of the red blood cells contained in them. In the interstitium of the cortical and brain layers, focal infiltrates, represented by lymphocytes and macrophages (in Fig. 13, are indicated by an arrow) were found. On one field of view, 1 or 2 glomerular devices with partial sclerosis or crescent are noted. There are also membrane proliferative changes (indicated by a double arrow in Fig. 14).

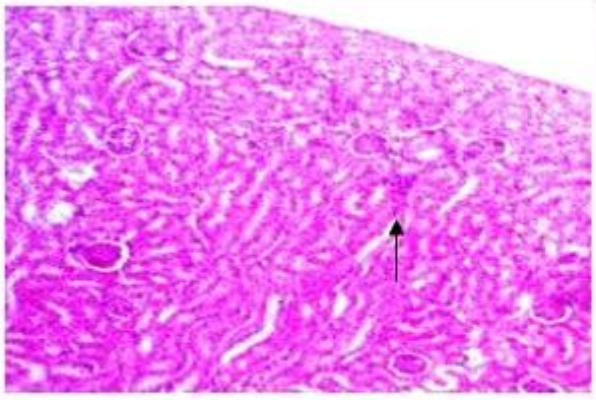

Fig. 13. Kidney of a rat of group 2 after modeling glomerulonephritis using adapted lymphocytes that took 5% soy flour for 60 days. Coloring GE. Magnification. 10x10.

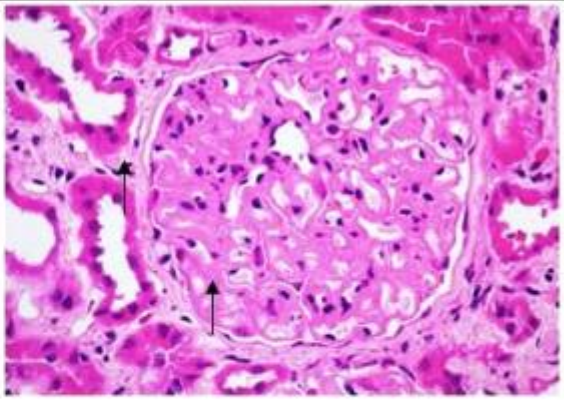

Fig. 14. The kidney of a rat of group 2 after modeling glomerulonephritis using adapted lymphocytes that took 5% soy flour for 60 days. Coloring GE. Magnification. 10x40.

When examining the liver, the parenchyma is divided into thin layers. The interlobular connective tissue forms the stroma, in which the vessels and bile ducts are located, the shingle and lobular structure is preserved (indicated by the arrow). Vessels with moderate blood filling. Parenchymal cells in 80% are mononuclear, and in 20% cells have 2 nuclei (Fig. 15).

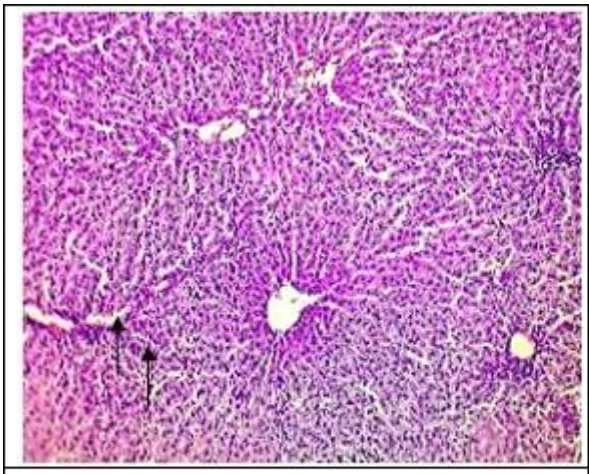

Fig. 15. Liver of a rat of group 2 after modeling glomerulonephritis using adapted lymphocytes that took 5% soy flour for 60 days. Coloring GE. Magnification. 10x10.

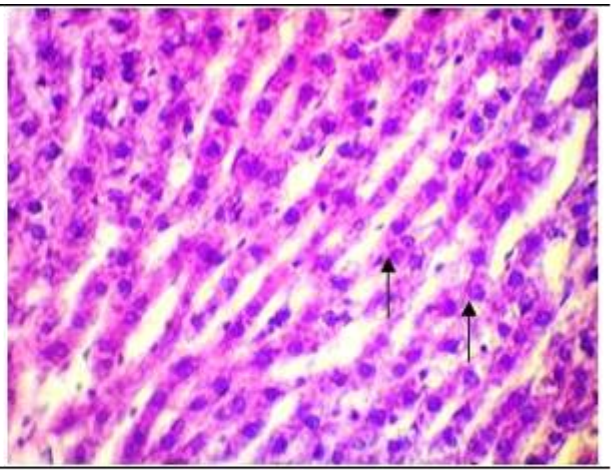

Fig. 16. Liver of a rat of group 2 after modeling glomerulonephritis using adapted lymphocytes that took 5% soy flour for 60 days. Coloring GE. Magnification. 10x40.

Nuclei unchanged with a delicate network of finely cobbled chromatin. Kupffer cells are single. The Disse space is slightly expanded in places (indicated by a double arrow). In some centers of the lobules, a decrease in hepatocytes is noted, a slight increase in granulomas and small cell nodules adjacent to the portal tracts is noted (Fig. 16).

The spleen of rats of the 2nd group of rodents had a typical structure. Outside, it was covered with a capsule of dense connective tissue. Trabeculae, represented by fibrous connective and smooth muscle tissues, departed from the capsule into the spleen. The spleen parenchyma was formed by lymphoid tissue in the form of lymphoid nodules and periarterial lymphoid couplings that make up the white pulp (indicated by an arrow in Fig. 17). Between them was a red pulp. The ratio of white pulp to red pulp was 1: 2.7. Primary lymphoid nodules were large dense accumulations of lymphocytes. In the lymphoid nodules, 4 distinctly distinguished zones were distinguished: the periarterial zone, the reproduction center (germination center), the mantle and marginal (marginal) zones (indicated by a double arrow in Fig. 18). In the control, almost half of the lymphoid nodules had distinct germinal centers.

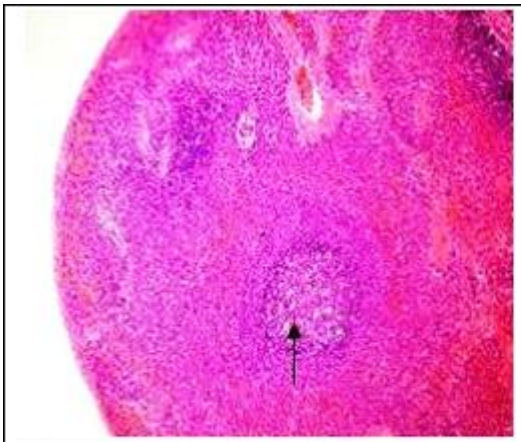

Fig. 17. Spleen of a rat of group 2 after modeling glomerulonephritis using adapted lymphocytes that took 5% soy flour for 60 days. Coloring GE. Magnification. 10x10.

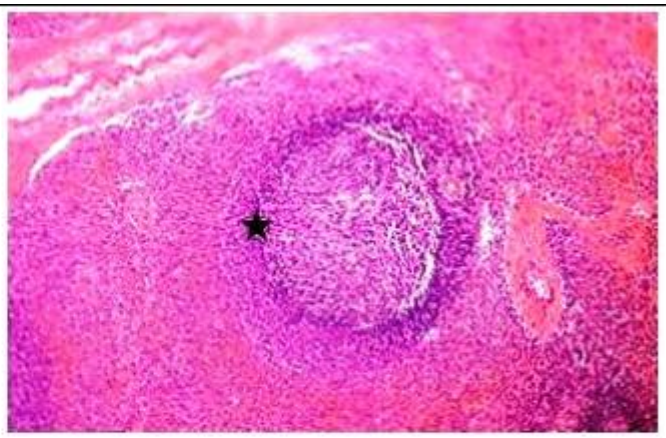

Fig. 18. The spleen of a rat of group 2 after modeling glomerulonephritis using adapted lymphocytes that took 5% soy flour for 60 days. Coloring GE. Magnification. 10x20.

Morphological studies of organs of rats of the 3rd group, which were fed with bakery products containing 10% soy flour, showed a suspension of the processes of sclerosis of the parenchyma of the kidneys and liver, which were expressed in animals that were not exposed to food containing soy flour. Lymphocytic reactive phenomena in all studied organs decreased, which manifested itself in an improvement in the functional state of cell organelles, and a decrease in edema of the interstitial tissue.

Macroscopically, the kidneys of animals of this group had the right bean-like shape, smooth elastic surface, no hemorrhages on the surface and under the capsule were found, the capsule is easily removed. In the section, the cortical layer is slightly darker than the cerebral layer, the border between the cortical and cerebral layers is noticeable. The wall of the pelvis is smooth, elastic, not thickened, no hemorrhages, clots and calculi were found. Histological examination of animal kidney preparations showed the safety of all structural elements of nephrons, vascular and stromal components of organs (Fig. 19 is indicated by an arrow). The tubules are lined with simple cubic epithelium. The renal glomerulus is surrounded by a Bowman capsule (indicated by a double arrow in Fig. 20). On these micropreparations, the urinary space (which appears as a transparent space between the glomerulus and Bowman's capsule) of the renal glomerulus is visible. At the same time, signs of membrane proliferative glomerulonephritis were preserved.

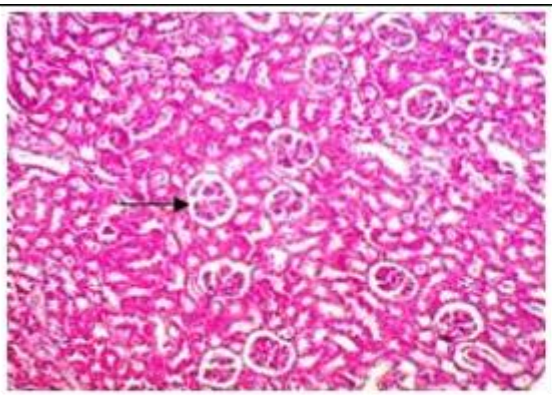

Fig. 19. The kidney of a rat of group 3 after modeling glomerulonephritis using adapted lymphocytes that took 10% soy flour for 60 days. Coloring GE. Magnification. 10x10.

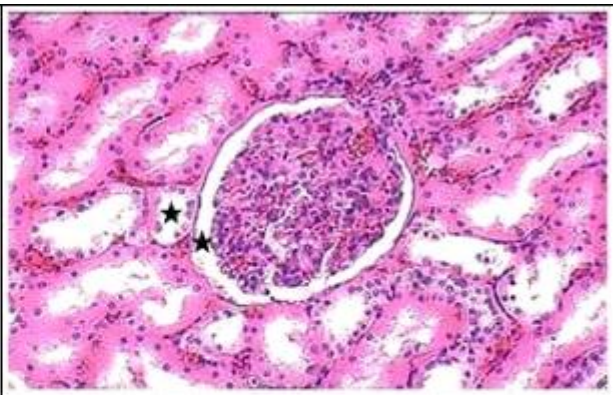

Fig. 20. The kidney of a rat of group 3 after modeling glomerulonephritis using adapted lymphocytes that took 10% soy flour for 60 days. Coloring GE. Magnification. 10x40.

Morphological examination of the liver of animals of the 3rd under the experimental group made it possible to establish that the organ is red-brown in color, the surface is smooth, the consistency is elastic, uniform. In the bile ducts, no stones or signs of stagnation of bile were found. On histological sections of the liver stained with hematoxylin and eosin, the preservation of the architectonics of the hepatic lobules was determined (indicated by arrows in Fig. 21). Their edges were determined by the location of the hepatic triads (Fig. 22).

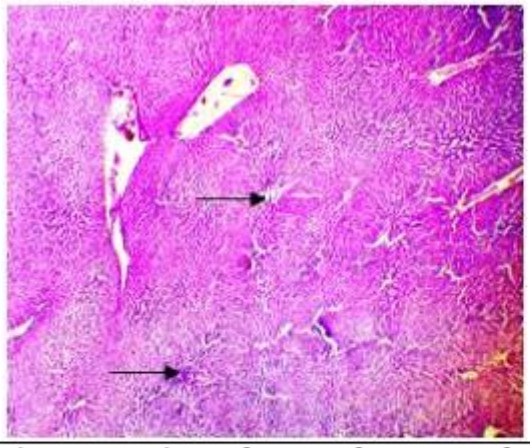

Figure 21. Liver of a rat of group 3 after modeling glomerulonephritis using adapted lymphocytes that took 10% soy flour for 60 days. Coloring GE. Magnification. 10x10.

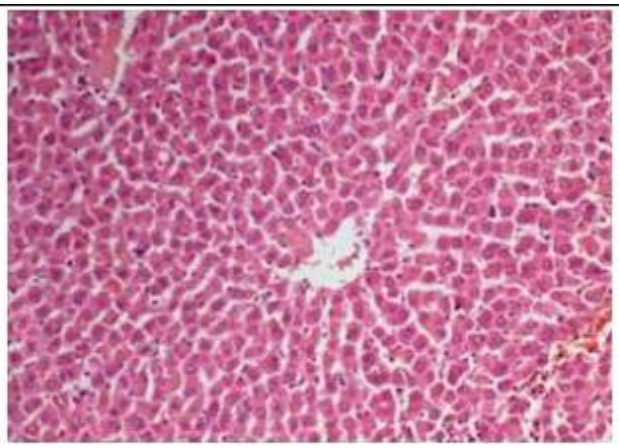

Figure 22. The liver of a rat of group 3 after modeling glomerulonephritis using adapted lymphocytes that took 10% soy flour for 60 days. Coloring GE. Magnification. 10x20.

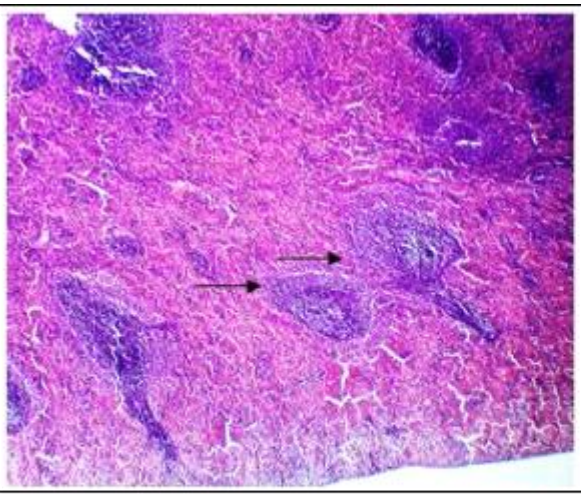

Fig. 23. The spleen of rats of group 3 after modeling glomerulonephritis using adapted lymphocytes, taking 10% soy flour for 60 days. Coloring GE. Magnification. 10x10.

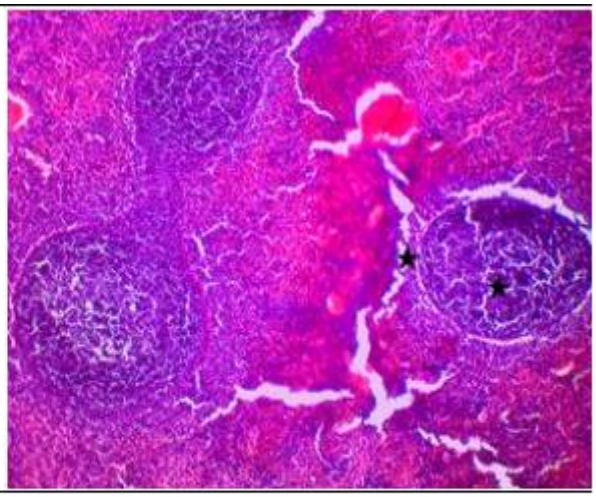

Fig. 24. The spleen of rats of group 3 after modeling glomerulonephritis using adapted lymphocytes, taking 10% soy flour for 60 days. Coloring GE. Magnification. 10x20.

During histological examination of the spleen of the 3rd experimental group, destructive changes in the structure of the organ were not noted. The white pulp of the spleen in animals is represented by well-defined lymph nodes and periarterial lymphatic vaginas (indicated by arrows in Fig. 23), nodules with germinal centers prevail among lymph nodes (Fig. 24 is indicated by a double arrow).

Discussion.

The rate of progression of renal failure in patients with CKD depends on a number of factors (violation of nutritional status, severity of anemia, arterial hypertension, remodeling of the heart and blood vessels, etc.), the correction of which can indirectly inhibit the onset of the terminal stage of the disease. Patients are recommended low-protein diet (MBD) with a reduced protein content. In addition to the usual MBD, which provides the consumption of 0.6-0.8 g of protein / kg / day, for the treatment of patients with CKD, a strict MBD with a very low protein content was proposed in combination with the administration of preparations containing essential amino acids (AA) or calcium salts them without nitrogen keto analogs

(KA). This combination allows you to safely limit your daily protein intake to 0.3 g protein / kg / day., Providing a sufficient amount of essential amino acids and a neutral nitrogen balance due to a decrease in urea nitrogen excretion.

In 2014, a document, very important for the management of these patients, was published - national clinical guidelines "Cardiovascular Risk and CKD: Cardiac Nephroprotection Strategies" prepared by the most respected professional associations of cardiologists, nephrologists, endocrinologists and therapists in the Russian Federation. They indicate that all patients with CKD, as well as concomitant CVD and diabetes, along with the appointment of MDBs, must have nutritional status monitoring to prevent protein-energy deficiency (Arutyunov G.P., Dragunov D.O. Chronic kidney disease. Nephrology. 2016. 1-24).

It is well known that high protein intake (primarily of an animal) is associated with peculiar hemodynamic changes in the kidneys, which are expressed in a decrease in renal vascular resistance, an increase in renal blood flow and glomerular ultrafiltration. Against this background, the coefficient of glomerular ultrafiltration (Kf) decreases. The decrease in Kf under these conditions is considered as a reaction designed to limit the uncontrolled growth of GFR in a separate nephron. It is clear that in such a situation, a decrease in Kf should lead to aggravation of intraglomerular hypertension. Obviously, such changes can contribute to the acceleration of renal damage according to the hemodynamic mechanism [Kucher AG et al., 2004; Kucher AG et al., 2007] However, the influence of a significant amount of protein in the diet on the state of the kidneys is not limited to hemodynamic effects. For example, against the background of increased protein consumption, an increase in the end products of glycation is observed, which trigger a complex cascade of reactions, including the generation of reactive oxygen species.

The latter, in turn, activate the signaling pathways of mitogen-activated protein kinases, protenkinase C, and transcription activators. This is accompanied by an increase in the expression of pro-inflammatory (NF - B, monocytic chemoattractant protein - 1, tumor necrosis factor) and pro-fibrotic (transforming growth factor, connective tissue growth factor, platelet-derived growth factor) substances. In this situation, the transformation of tubule cells into myofibroblasts occurs, which, ultimately, leads to tubular atrophy and interstitial fibrosis. Aggravation of acidosis and activation of endothelin-1 [U ribarri J et al., 2006; Wesson DE et al., 2007]. It should be noted that the question of the relationship between protein intake and kidney status is extremely complex [Lentine K et al., 2004; Pecoits - Filho R, 2007]. Apparently, such relationships are determined not only by the quantity, but also by the quality of dietary protein. There is reason to believe that plant proteins have a lower burden on the kidneys than animals. At the same time, soy proteins (even with high protein intake) may have not only a lesser negative effect on renal hemodynamics, but also have a cardioprotective, nephroprotective and antisclerotic effect [Kucher AG et al., 2007; Uribarri J et al., 2006; Sacks FM et al., 2006].

In the practice of treating patients at the pre-dialysis stages of CKD, quite a few options are used for dietary prescriptions related to the restriction of protein intake, although the results of the use of low-protein diets (0.6–0.8–1.0 g protein / kg body weight / day) in terms of deceleration CKD progression has been mixed [Klahr S et al., 1994; Hansen HP et al., 2002; Meloni C et al., 2002; Pijls LT et al., 2002; Meloni C et al., 2004]. Nevertheless, recent accumulated data suggest that protein restriction in the diet does lead to a moderate positive effect in terms of renal prognosis for CKD [Fouque D, Laville M, 2009]. In children with CKD, the protein content in the diet should correspond to the age norm, since its deficiency negatively affects growth and development. An exception may be situations with extreme severity of hyperphosphatemia and hyperparathyroidism The inclusion in the MDB of a mixture of essential amino acids and their keto analogs slows down the progression of

CKD [Teschan PE et al., 1998; Prakash S et al., 2004; Mitch WE, 2005]. When using the preparation of essential amino acids and their keto analogs, the prolonged use of a low-protein diet in the pre-dialysis period does not cause protein metabolism disturbance, which favorably affects the results of subsequent replacement therapy [Chauveau P et al., 2009]. Finally, the experience of many years of using MDBs with the inclusion of SUPRO 760 soy isolate (0.3-0.4 g protein / kg / BMI / day based on conventional foods plus soy isolate at the rate of 0.3-0.2 g protein / kg / BMI / day) suggests that such diets can indeed slow the progression of CKD, at least in some patients [Kucher AG et al., 2007].

CONCLUSION

1. The introduction into the diet of animals with experimental glomerulonephritis of bakery products enriched with 5% and 10% soy flour is safe, does not cause additional pathologies and death of animals, and slightly improves the course of the disease.

2. In animals of the 1st experimental group with GLOMERULONEPHRITIS receiving bakery products without soy flour, chronic tubulointerstitial nephritis (ChTIN) with focal nephrosclerosis was established. Macroscopically, the kidneys are enlarged due to interstitial edema and inflammation, the border between the cortical and brain layers is not noticeable. Under the capsule and in the cortical layer - petechial hemorrhages. The tissue of the renal parenchyma is sometimes replaced and squeezed by focal growths of connective tissue. Periglomerular and peritubular types of sclerosis prevail. The glomeruli of the cortical layer outside the areas of ingressive sclerosis are enlarged.

3. The histomorphological picture in the kidneys of animals of the 2nd experimental group receiving bakery products with 5% soy flour content was characterized by less pronounced lymphocytic infiltration in the renal interstitium and interstitial edema was observed only in two micropreparations. A small amount of atrophied renal tubules is noted. Compared with group 1 of the studied animals, under the capsule and in the cortical layer, petechial hemorrhages are not observed. The tissue of the renal parenchyma is less replaced by proliferation of connective tissue compared with the first experimental group. A small number of glomerular sclerosis is observed.

4. Morphological studies of organs of rats of the 3rd group, which received bakery products with 10% soy flour, showed a suspension of the processes of sclerosis of the renal parenchyma, which were expressed in animals of the 1st group. Dystrophic phenomena in all studied organs decreased, which manifested itself in an improvement in the functional state of cell organelles, and a decrease in edema of the interstitial tissue.

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