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The Effect Of Polioxidonium And Dimephosphone In Small Doses On The Morphology Of The Fixed Digestive Glands Of Rats.

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ABSTRACT

The article presents the results of the study of the liver and pancreas of white rats after intramuscular administration of drugs polioxidonium and dimephosphone in small doses.

Keywords: nanotechnology, morphology, liver, pancreas, white rats, polioxidonium, dimephosphone, small doses.

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INTRODUCTION

In the modern world, nanotechnologies are becoming more and more active in all spheres of human activity [1, 9, 11], and there are more and more informational messages about the use of medicines obtained with the help of these technologies [4, 10]. With the use of modern nanotechnology methods, in medicine and veterinary medicine, a number of studies have been conducted that have shown positive results in the effect on the body of small doses of biologically active substances [5,13]. In this regard, the search and creation of such new and modern products, as well as methods for their use, is growing every year not only abroad, but also in our country, and research in this direction is becoming increasingly relevant. Nanotechnology, as a scientific area, has been quite successfully tested in obtaining new drugs, biologically active substances, used both in medicine and veterinary medicine [8]. The use of currently used drugs with known properties in veterinary medicine in recommended doses and schemes sometimes opens up several other, sometimes unknown, properties of these drugs when they are introduced into animals in small and ultra-low doses, which can be qualified as a new direction of application these medicines.

Immunomodulators occupy an important place in the treatment and prevention of various diseases in animals and humans, which is confirmed by numerous studies [3, 6, 7, 12], so studying the effect of these drugs in small doses is relevant in veterinary science.

MATERIALS AND METHODS

Experimental studies were carried out on male outbred white rats weighing 180–200 g contained in the vivarium of the Department of Pharmacology and Toxicology, according to zootechnical requirements. Different concentrations of aqueous solutions of polioxidonium (PO) and dimephosphone (DF) were previously prepared by serial serial dilutions using bidistilled water. The duration of the experiment was 25 days and included 5 series of injections of the drug and bidistilled water successively every 5 days. According to the analogy principle, 3 groups of animals, 5 males in each of them, were formed to study the effect on their body of various biologically active substances (BAS) polioxidonium and dimephosphone preparations. The first group of animals was the control, 2nd and 3rd groups - experimental, which were injected drugs in a volume of 1 ml intramuscularly from the inner surface of the thigh, diluted in double-distilled water. Control animals were injected with 1 ml of bidistilled water. In the 2nd experimental group, the PO preparation was administered in the form of a highly diluted solution at a dose of 1×10^{-6} mg / ml, in the 3rd group (DF) - 2×10^{-2} mg / ml.

Histological studies were carried out according to the generally accepted method, for this, pieces of the liver and pancreas were fixed in 10% neutral Becker's formalin solution [2]. The material was compacted by pouring in paraffin, wiring was done in the conventional manner, and then 5- parathin histo-slices were prepared. 7 microns on a sled microtome. To study the general structure of the liver and pancreas, histosections were stained with hematoxylin and eosin. The analysis of histopreparations and their photomicrographing were performed using an image visualization complex consisting of a biological microscope Altami BIO 1 and a digital USB camera USMOS08000KPB with Altami Studio software.

RESULTS AND DISCUSSION

A specific feature in rats is the poorly expressed pattern of the lobular structure of the liver, since the layers of loose connective tissue between the lobules are insignificant. In the control rats, the liver lobules had a polygonal shape, the beam pattern of hepatocytes in the lobule was preserved (Fig. 1). The central veins of the lobules in the lumen contained blood corpuscles. In some of the lobules, a thickening of the basement membrane of the veins and plasma soaking of their wall was noted. Slightly dilated sinusoids contained blood cells. A few stellate macrophages (Kupffer's cells) were detected between endotheliocytes, some of them were also observed in the lumen of sinusoids. Hepatocytes were characterized by a polygonal shape, had a rounded nucleus, two were detected in some cells, but most of the cells were mononuclear. In hepatocytes, granular dystrophy was observed, characterized by the accumulation of fine acidophilic granularity in the cytoplasm. In such cells, the outlines of the nucleus and the boundaries of the cells differed with difficulty. Among the hepatocytes, degenerating forms with a nucleus in the state of karyolysis and karyorrhexis were also detected. In the centrolobular regions of the parenchyma, especially near the central veins of the lobules, we detected minor lymphocyte-macrophage infiltrates (Fig. 1). In the liver triad, the lumen of the interlobular artery was desolate; in Vienna, a small number of formed blood cells with the presence of lymphocytes, as well as cellular

detritus and macrophages were observed (Fig. 2). In the walls of blood vessels, plasma soaking was noted. The bile duct contained a secret with an admixture of exfoliated cells.

The liver of rats after the administration of polioxidonium at a dose of 1×10^{-6} mg / ml was characterized by a well-defined beam structure of the lobules, both in the center of the lobules and at their periphery. Sinusoids had minor gaps that were free of blood cells.

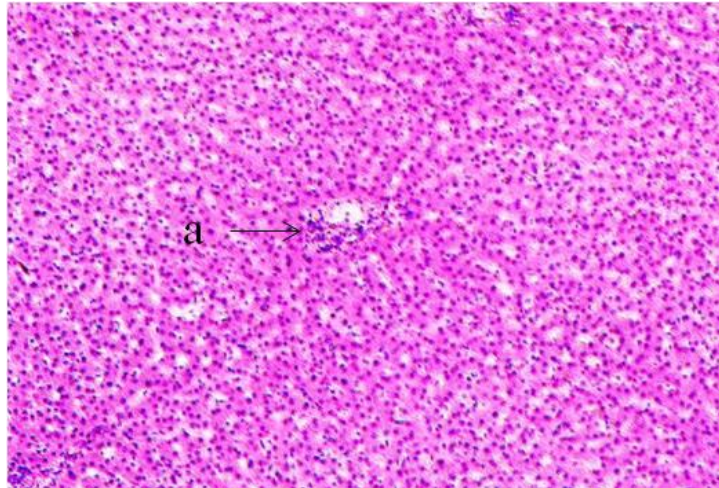


Figure 1: Parenchyma of the liver of a rat of the control group with pronounced hepatic beams and a central vein with perivascular lymphocyte-macrophage infiltration (a). Stained with hematoxylin and eosin.x250.

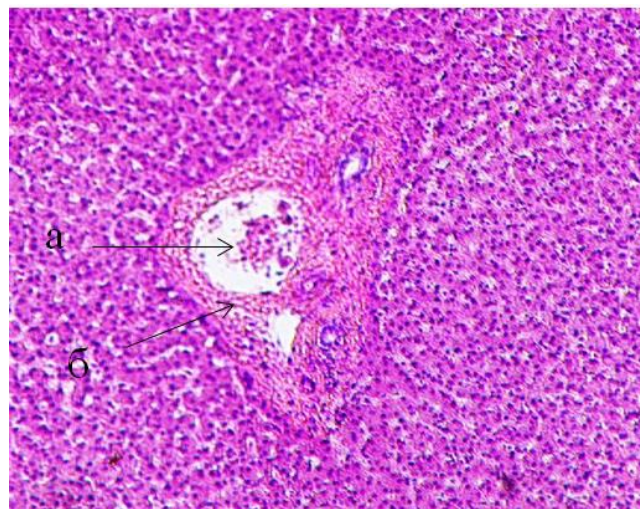


Figure 2: Liver triad in control rats. Lymphoid elements and macrophages in the lumen of the interlobular vein (a).Plasma impregnation of the walls of blood vessels (b).Envhematoxylin and eosin.x250.

The number of hepatocytes with acidophilic granularity has significantly decreased, while we observed clearly defined cell boundaries. In beams among hepatocytes, the number of cells with two nuclei increased.

In the liver triad, the plasma soaking of the walls of the interlobular arteries and veins was weakly preserved, and the lumens of these vessels were desolate. The lumen of the bile duct did not contain a secret with desquamated cells. Lymphoid macrophage infiltrates in the liver parenchyma were not observed after administration of polioxidonium in a small dose to rats.

The liver of rats after dimephosphone administration at a dose of 2×10^{-2} mg / ml was characterized by a well-defined beam structure of the lobules. The lumen of the central vein was desolate, and the sinusoids

in the centrilobular regions were slightly enlarged. The number of hepatocytes with acidophilic granularity decreased markedly, and the boundaries of the cells were clearly delineated. In liver lobules, the number of functionally active hepatocytes increased while the number of degenerated cells decreased. In the triad of the liver, the plasma soaking of the walls of the artery and vein was weakly maintained, with the desolation of these vessels. The lumen of the bile duct did not contain a secret with desquamated cells. Lymphoid macrophage infiltrates in the liver parenchyma were not observed in small doses after administration of dimethosphone in rats.

The pancreas of white rats is covered on the outside with a capsule of dense unformed connective tissue, from which connective tissue strands, dividing the gland parenchyma into lobes of different sizes, enter the body. The interlobular connective tissue had a weakly expressed fibrous component, was thinned and edematous in some places, as a result, the lobulation in such areas was poorly expressed. In interlobular interlayers of connective tissue, blood vessels, nerve fibers and excretory ducts were detected. Blood vessels were characterized by plasma soaking of the walls, and the lumen of the venous vessels was filled with blood cells, in some vessels the plethora was pronounced. In some rats on sections of the gland in the arteries and veins, passing in the interlobular connective tissue, the formed elements of the blood were not detected, or were observed in small quantities. The interlobular excretory duct was formed by a single-layer prismatic epithelium and its own lamina from connective tissue. In the lumen of the excretory duct contained a secreted substance in small quantities. The control rats were characterized by the presence of mainly medium sized lobules, in which the exocrine part in the form of acini and ducts of different diameters prevailed significantly.

When polioxidonium was used in rats in a small dose (1×10^{-6} mg / ml), an increase in the number of pancreatic cells forming the wall of the terminal secretory section was observed in the pancreas. The endocrine portion of the lobules of the pancreas in experimental rats, compared with that in control animals, did not change significantly. Changes in these gland structures were associated only with a change in their size, since the pancreatic islets in experimental rats when using polioxidonium in a small dose became much larger than in the control, the insulocytes in the islands were rather tight and close to each other.

After administering to the experimental rats of the 3rd group of dimethosphone in a small dose, the acini was slightly increased in diameter due to the increasing number of pancreatic cells in the pancreas, and well-formed loose fibrous connective tissue was detected between the acini. After the use of dimethosphone in a small dose in rats, we observed changes in the vascular system of the organ in the histo-sections of the pancreas, namely, normalization of the structure of the vessel membranes, with no signs of plasma soaking of the vessel walls. The blood filling of the interlobular veins was characterized by a weak degree, in some cases it was moderate. The endocrine portion of the pancreatic parenchyma in experimental rats of the 3rd group, in comparison with the control, did not change quantitatively enough, since 1-2 pancreatic islets were still detected in the lobules. The main changes in these gland structures were associated with changes in their size, since the pancreatic islets became larger than in the control, and the insulocytes in the islets were located more densely.

CONCLUSION

Thus, it can be concluded that the use of drugs in small doses (1×10^{-6} mg / ml - PO, 2×10^{-2} mg / ml - DF) does not adversely affect the structural and functional state of the fixed digestive glands but, on the contrary, allows it to normalize. Thus, in the liver, the manifestation of the lymphoid-macrophage reaction and activation of the mitotic process occur due to the appearance of a greater number of binuclear hepatocytes, normalization of the blood flow and suppression of the process of plasma soaking of the blood vessel walls. increase in the number of insulocytes with their more dense location in the pancreatic islets, while the number of their islands in the lobules remains at the level of their detection in the control animals.

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