



## Myocardial Changes in the Background of Experimental Diabetes Mellitus

**Akhmedova S.M**

Tashkent Medical Academy

**Sodikova Z.Sh**

Tashkent Medical Academy

**Tolmasov R.T.,**

Tashkent Medical Academy

**Yusupova Sh.A.**

Tashkent Medical Academy

ABSTRACT

Dystrophic changes were observed in the myocardium of the heart wall of rat pups born from mothers in the state of experimental diabetes mellitus. The observed changes reached a maximum by the 14th day of the study, manifesting as perivascular and interstitial lymphohistiocytic infiltrate

**Keywords:**

Heart, myocarditis, diabetes mellitus, cardiomyocytes, connective tissue fibers.

**Introduction.** Diseases of the cardiovascular system remain one of the main health problems in developed countries and its relevance is due to frequent polyetiological myocardial lesions in any age period of a person's life. Experiments on modeling various types of myocardial damage in combination with the use of morphological research methods contribute to solving the main issues of the problem of the pathogenesis of diseases of the heart wall. A significant place among the visceral lesions in gestational diabetes mellitus is occupied by changes in the heart and vascular system, occurring with a frequency of 30 to 83%. The endocrine and cardiovascular systems in the body are closely interconnected. The physiological role of the heart and vascular system is well known. The aim of this work was a morphofunctional study of the liver in experimental streptozotocin diabetes mellitus.

**Objects and methods of research.** The object of the study was the liver of outbred white rats weighing 200-250 g. An experimental model of diabetes mellitus was created by a single intraperitoneal injection of streptozotocin (Streptozocin, Sigma) in citrate buffer (Citratebuffer solution, 0.09M, Sigma) at a dose of 40 mg/kg, the injection volume was 0.5 ml / 200 g of body weight.

**Purpose of the study:** Revealing structural changes and morphological features of the wall of various parts of the heart of rat pups born to mothers with diabetes mellitus.

**Materials and research methods.** The object of the study was the hearts of 50 outbred rats of the following age groups: 3, 7, 14, 21, 30 days. Rats were divided into 2 groups. The first group was the experimental group. In the experimental group, on the 3rd day of life, streptozotocin was injected intraperitoneally in

an amount of 4 mg per 100 g of body weight to induce an experimental diabetes model, and blood sugar levels were measured periodically by drawing blood from the tail vein.

Group 2 was a control group, in which 0.9% physiological solution was injected into the abdominal cavity of rats. Rats in the control and experimental groups were euthanized by decapitation at different periods of postnatal ontogenesis. After the expiry of the experimental period, the experimental and control groups were treated with etheric drugs. After that, the heart of the animal is removed, fixed in 10% neutral formalin, followed by conductive and alcohol, filled with paraffin and prepared sections. Iz paraffin blocks with prepared histological sections 8-10  $\mu\text{m}$  thick. Hematoxylin and eosinoma with microseresis crystals, van Gisonom [5].

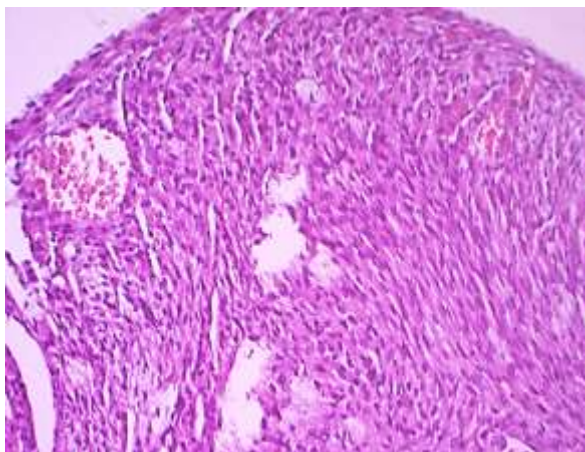


Figure 1. Plethora of the vessels of the pancreas of the heart and blood filling. Stained with hematoxylin and eosin. SW: about. 20, ok. 10

After 14 days, an increase in edema was noted in the myocardial stroma, mainly in the perivenular and pericapillary spaces. Collagen fibers are swollen, loosened, in some places there is a stratification of collagen bundles (Fig. 2), swelling of the basic substance of the connective tissue with initial signs of surface disorganization. Connective tissue cells swell, their nuclei slightly increase in size. Vascular disorders are widespread, endothelial cells in the vessels are swollen, acquire a rounded shape. In the cytoplasm of cardiomyocytes, small vacuoles filled with transparent

**Results and discussions.** Analysis of the results of the study shows that in rat pups of 3 days of age, the histological picture of the myocardium does not differ from the control group. Cardiomyocytes have an oblong shape, form muscle fibers. The nuclei of cardiomyocytes are oval in shape, located in the center of the fiber, myofibrils are clearly differentiated. In the subepicardial zone of the myocardium, dilated and full-blooded veins were found with signs of redistribution of blood by the presence of sluggish erythrocytes. Beginning edema was revealed in the myocardial stroma. Morphological examination of the heart of 7 day old rat pups with minor changes in the form of expansion of visible vessels. Edema of the myocardial stroma has a focal character (Fig. 1).

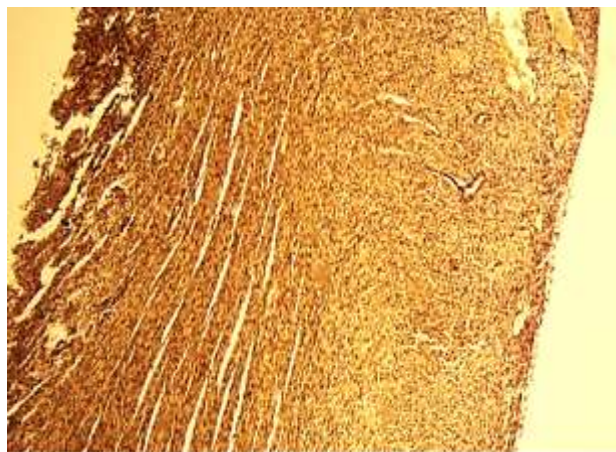


Figure 1. Plethora of the vessels of the pancreas of the heart and blood filling. Stained with hematoxylin and eosin. SW: about. 20, ok. 10

cytoplasmic fluid were found; hydropic degeneration develops. Intracellular edema is focal in nature, along with dystrophic altered cardiomyocytes, there are unaffected cells. After 21 days, vascular disorders persist in the myocardium: a pronounced plethora of veins, stasis, numerous edematous perivascular hemorrhages of a diapedetic nature, an increase in the intensity of edema is noted. the liquid is located between the muscle fibers, as if pushing them apart (Fig. 3).

After 30 days, interstitial edema intensifies and spreads to the entire myocardium (Fig. 4),

reaching the greatest value in the perivenular spaces. After 21 days, vascular disorders persist in the myocardium: a pronounced plethora of veins, stasis, numerous edematous perivascular hemorrhages of a diapedetic nature, an increase in the intensity of edema is noted. the liquid is located between the muscle fibers, as if pushing them apart (Fig. 3).

After 30 days, interstitial edema intensifies and spreads to the entire myocardium (Fig. 4), reaching the greatest value in the perivenular spaces.

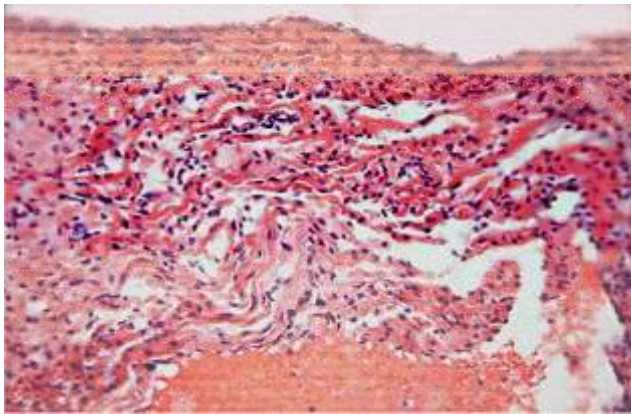


Figure 3. Right atrium of a 21 day old rat. Expansion of veins is noted, with a moderate thickening of the middle layer of the wall. Stained with hematoxylin and eosin. X: 10x20.

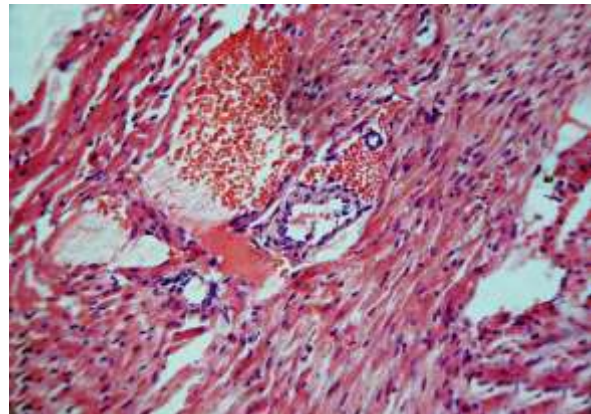


Figure 4. Day 28. Expansion of the sinusoids, inflammatory infiltrate around the arteries and interstitium. Stained with hematoxylin and eosin. X: 10x20.

As a result of edema, swelling of collagen fibers, their stratification and defibrillation is observed. The main substance swells and collapses, signs of disorganization of the connective tissue appear. Dystrophic changes in the myocardium acquire a diffuse character, there is an increased resorption of the cytoplasm, intracellular edema. The foci of plasmolysis are numerous and larger than on the 21st day. Intracellular myocytolysis extends to the entire myocardium, total damage to cardiomyocytes is noted. In the focus of myocytolysis, most myofibrils are absent, single fibers are visible.

### Conclusions

Thus, the analysis of the data shows that in the myocardium of the heart of rat pups born from mothers in the state of diabetes

mellitus, dystrophic and atrophic changes in cardiomyocytes, diffuse edema and stromal fibrosis. These changes are more pronounced in rat pups 7-14 days old.

### Bibliography

1. Obrezan A. G., Bitsause R. M. The structure of cardiovascular diseases in patients with round 2 diabetes mellitus, diabetic cardiomyopathy as a special condition of the myocardium // Bulletin of St. Petersburg University. - St. Petersburg, - 2008. - Ser. 11. - Issue. 2. - S. 47-53. Sarvilina, I.V., Maklyakov Yu.S., Shin E.F.
2. Dedov I.I., Shestakova M.V., Ametov A.S., et al. Initiation and intensification of hypoglycemic therapy in patients with diabetes mellitus 2nd round: updating

- the consensus of the expert council of the Russian Association of Endocrinologists (2015). // Diabetes. - 2015. - T. 18. - No. 1. - P.4-22.
3. Aleksandrovich Yu.S. Intensive care of diabetic ketoacidosis in children. / Yu.S. Aleksandrovich K.V. Pshenisnov.// Russian Bulletin of Pediatric Surgery, anesthesiologists, resuscitators.-2012.- T.2.-No.2.-S.92-99
  4. Critical conditions in clinical practice. // S. A. Rumyantseva, V. A. Stupin, V. V. Afanasiev, A. I. Fedin, E. V. Silina - M .: MIG "Medical Book"; 2010. — 640 p.
  5. Brown, T.B.4. Cerebral edema in childhood diabetic ketoacidosis: Is treatment a factor / T.B. Brown // Emerg. Med. J. - 2004. - No. 21. - P.141-144.
  6. Wolfsdorf, J. Diabetic ketoacidosis in infants, children and adolescents: A consensus statement from the American Diabetes Association / J. Wolfsdorf, N. Glazer, M.A. Sperling // Diabetes Care. - 2006. - No. 29. - P.1150-1159.