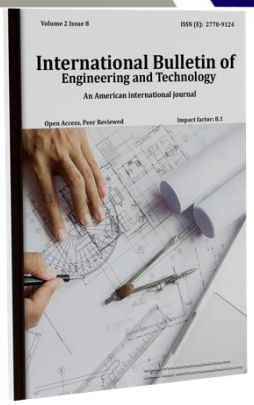

MORPHOLOGICAL CHANGES IN THE NEPHRON SYSTEM AND RENAL CORTEX OF OFFSPRING OBTAINED WITH STREPTOZOTOCIN DIABETES MELLITUS (90TH DAY)

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Abstract

A number of scientific studies are being conducted worldwide to assess the morphological changes in the renal cortex of offspring taken under conditions of streptozotocin diabetes. In this regard, the morphological structure of the kidneys in different periods of postnatal ontogenesis, morphological changes in the cortical part of the kidneys of offspring born from female rats with experimental diabetes, histochemical assessment of the renal cortex of offspring born from female rats with experimental diabetes, as well as the development of an algorithm for developing the mechanism of kidney damage in offspring born from female rats with experimental diabetes have been studied. works separately. In our country, certain measures are being implemented aimed at developing the medical sphere, adapting the medical system to the requirements of world standards, including early diagnosis, treatment and prevention of complications of somatic diseases. In this regard, in accordance with the seven priorities of the New Uzbekistan development strategy for 2022-2026, in raising the level of health care for the population to a new level, such tasks as improving the quality of qualified services to the population in the primary health care service have been identified. Based on these tasks, it is desirable to conduct research on the morphometric assessment of morphological changes in the renal cortex of offspring taken under streptozotocin diabetes conditions.

Key words: morphology, morometry, kidney, glomerulus, hyperglycemic nephropathies, atrophy, sclerosis, streptocasin diabetes mellitus.

Introduction

The streptozotocin (STZ) diabetes model is commonly used to study diabetic nephropathy, but the histological renal damage is subtle and does not resemble or differ from that seen in diabetic patients. A rat model of type 2 diabetes spontaneously develops overt renal histology abnormalities .

Diabetic nephropathy, mainly type 2 diabetes, is the leading cause of end-stage renal disease in Western countries. Type 2, or non-insulin-dependent diabetes, is not a clearly defined disease. It represents a variety of metabolic disorders with one common feature: inappropriate chronic hyperglycemia and glucose intolerance. Although many patients with type 2 diabetes and microalbuminuria have classic Kimmelstiel-Wilson morphology, most have minimal or absent glomerular changes with vascular and interstitial lesions. Increased glomerular volume predicts the development of overt nephropathy in type 2 diabetes. In contrast, some have found changes in glomerular volume in type 2 diabetes .

The purpose assessment of morphological changes in the cortical part of the kidneys in offspring born from female rats with streptozotocin diabetes.

Subjects of the study: outbred, previously never given birth female rats weighing 160-180 g in the amount of 40, and 180 rat pups born from them (control group - 80, experimental group - 100), the cortical part of the kidneys of rat pups for morphological and morphometric studies**.**

Results and discussiona.

Under experimental conditions, on the 90th day of the process, the transformation of sparse fibrous structures into coarse fibrous ones with rapid synthesis of collagen fibrous structures continues. At the same time, the process of hyalinosis and thickening of fibrinoid in the wall of the afferent arterioles entering the glomeruli continues sometimes with the appearance of foci of fibrinoid necrosis. In our study, the following morphological changes were observed after 90 days.

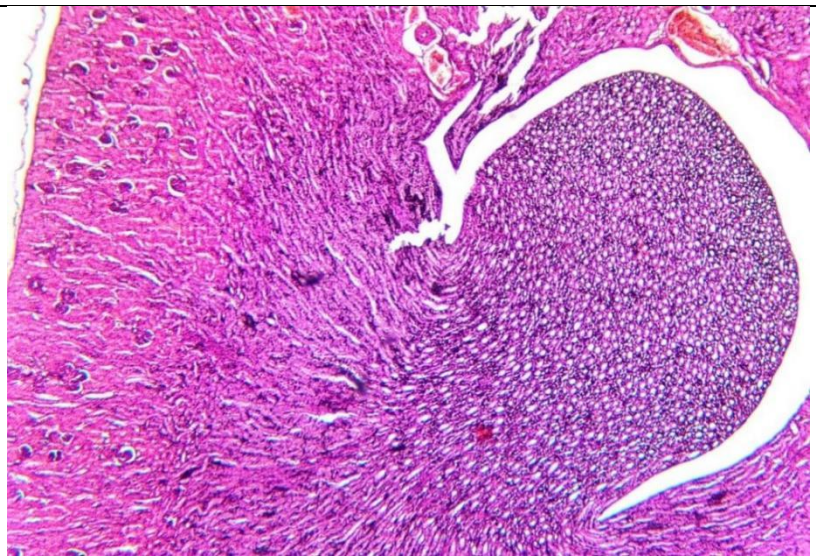


Figure 1. Results obtained on the 90th day of the study. General view of the kidney section. Most of the cortex glomeruli are atrophically changed. The contours and relief of the proximal tubules are practically not visible. The image, stained with hematoxylin and eosin, is 40x10.

The cortical layer of the cortex was slightly deformed in shape, the spaces from the enlarged fine mesh were widened, this was manifested by the appearance of foci of nodular and diffuse sclerosis in the pernipheries of the spherules. In particular, the subcapsular tangles continued to increase in size compared to the tangles located near the nucleus, and in the reticular tangles, the capillary bundles were displaced to the periphery. Mesangial cells pushed podocytes to the edge, and an expansion of Bowman's space was detected in this area, compression compression at the entrance to the afferent vessel, and the development of foci of hyalinosis on the arteriole wall. Focal glomerulosclerosis was found in the tangles close to the medulla (see Fig. 1). The expansion of the "magnificent reticular" space continues, podocytes become visible, and it is determined that the primary urine is poorly filtered in the space of the proximal tubules extending from these glomeruli (see Fig. 1). This process, in turn, leads to deformation of the Bowman's capsule and metaplastic changes in the squamous epithelial cells. In particular, in Bowman's space, the intercapillary (SIC) is characterized by an accumulation of positive structures (see Fig. 2).

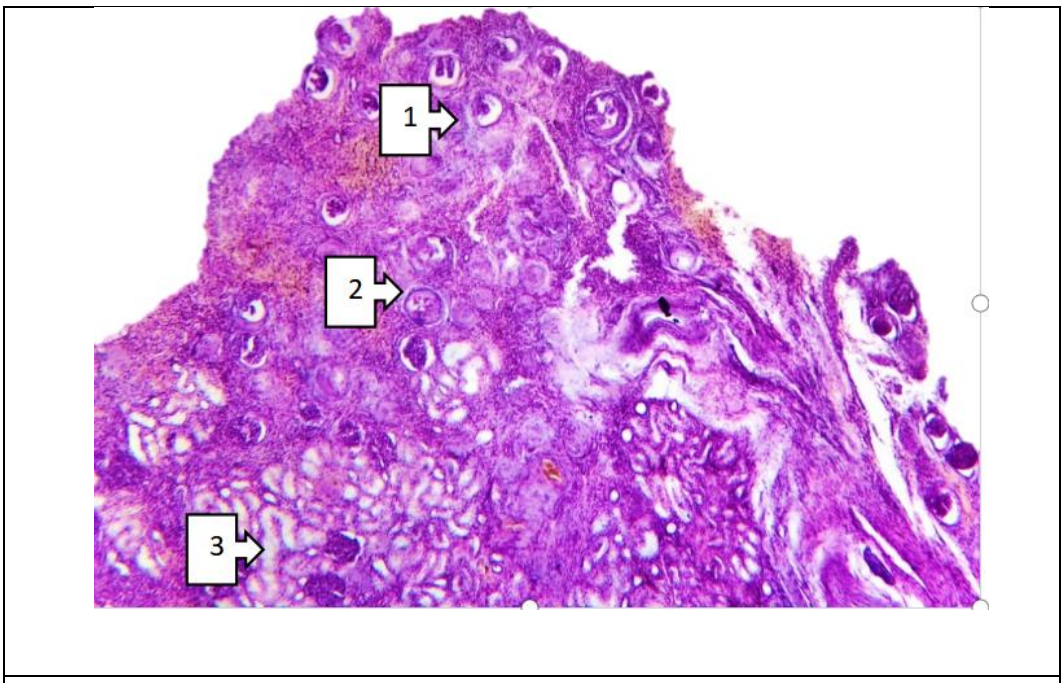


Figure 2. Results obtained on day 90 of the study. In some glomeruli, the glomerular borders in the cortex branching have almost disappeared (1), numerous glomerulosclerotic balls are revealed (2), the presence of mesh homogeneous protein structures is revealed in the cavity of most proximal tubules (3), the epithelium of the gastric mucosa tubules is enlarged and metaplastic. Hematoxylin-eosin stained image, size 10x10.

As a result, positive structures of the PAS are characterized by the formation of nodular sclerosis nodules (Kimmelstiel-Wilson), characteristic of diabetic nephropathy. The formation of homogeneous "intramambranous capsular drops" with eosinophilic inclusions between the basement membrane of the Bowman's capsule is characteristic (see Fig. 3). In this case, a decrease in the capillary space in the glomeruli, a decrease in the number of podocytes, a general decrease in fine-mesh capillaries (in one glomerulus 50 capillaries, with DN this figure decreases to 3 times), a sharp decrease in intercapillary spaces, on the contrary, an increase in the Shumlyansky-Bowman capsule and in most cases ends with the formation of foci of glomerulosclerosis. In the proximal tubules around the glomerulosclerosis, a small amount of dark pink filtrate is detected. In the epithelium of the proximal tubules, numerous foci of dystrophy with hyaline droplets are observed. Hyaline droplet dystrophy is an irreversible process, initially segmental necrosis, then the appearance of necrotic nephrotic foci, ending with coagulation necrosis of the renal cortex. As a result, the clinically long course of the process is manifested in the form of chronic renal failure: oligoanuria, proteinuria, glucosuria, anuria. Uremic intoxication is the main cause of death: uremic pneumonia, uremic encephalopathy, uremic bronchitis, uremic gastroenterocolitis, etc. Metaplasia, hyaline and hydropic dystrophy of the distal tubular epithelium are observed around the glomerulosclerotic glomeruli. In this case, the space of the distal tubules continues with varying degrees of expansion. A mesh homogeneous protein structure is determined in the cavity of the channels

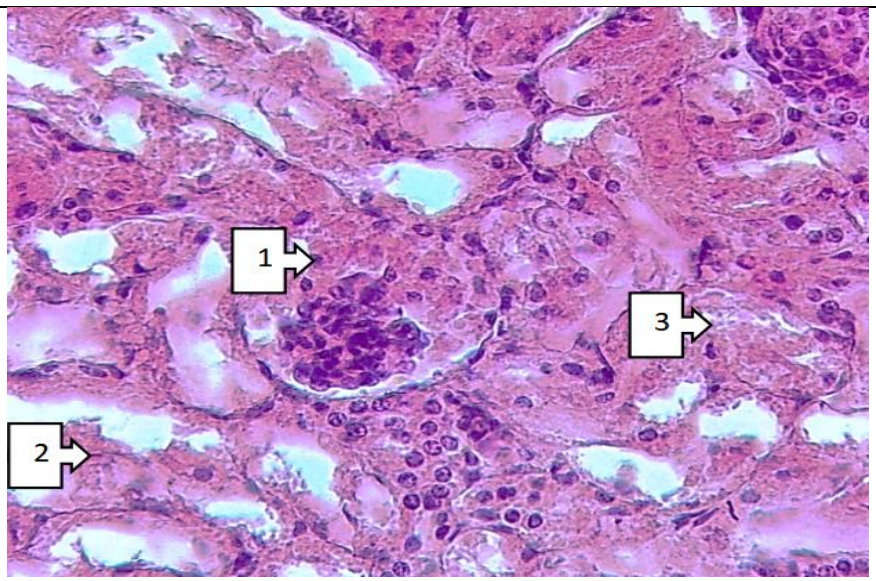
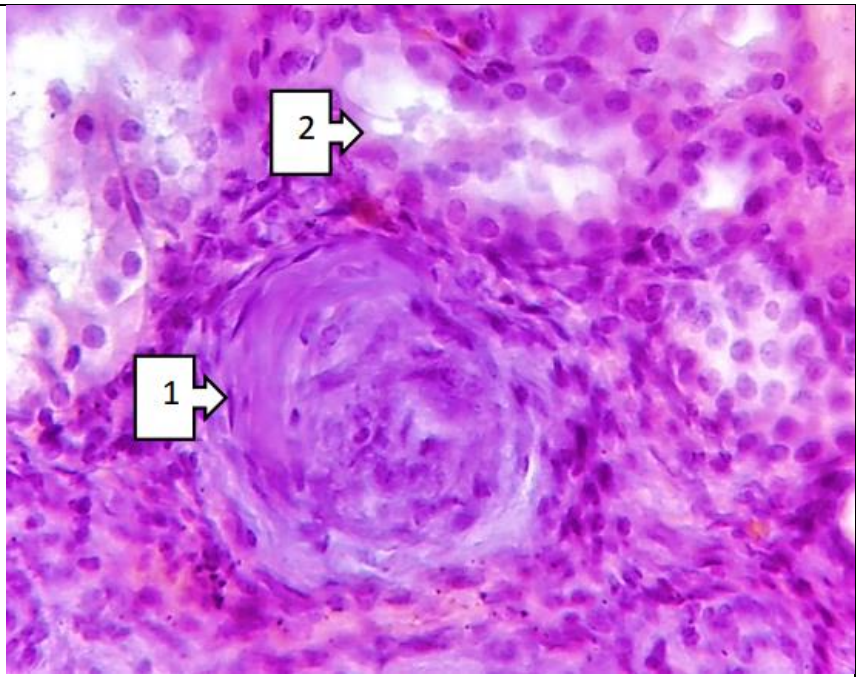


Figure 3. Results obtained on day 90 of the study. Widespread glomerulosclerosis "Kimmelstiel-Wilson node" (1), foci of segmental necrosis in the epithelium of the proximal tubules (2), reticular protein structures are found in the epithelium of the proximal tubules (3). Hemotoxylin-eosin stained image size 40x10.



Due to the fullness of the blood vessels of the pericanalicular vein, small examinations in the cortex of the kidney reveal foci of focal diapedetic hemorrhage. At the same time, the process of tubulointerstitial fibrosis and sclerosis continues in the medulla (see Fig. 4).

On the 90th day of our experiment, in addition to the above-mentioned dystrophic and necrobiotic changes and sclerotic changes, atrophic changes were also detected. For example, on the 90th day of diabetes induced in the experiment, it was established that during the development of the nodular sclerosing process in the afferent vessels of the glomeruli,

"Wilson's Kimmestil" cells developed in the cortical layers of the rat kidneys. These changes are characteristic of a protracted period of diabetes mellitus and are considered a segmental variant of diabetic glomerulosclerosis. However, it is worth noting that, using the Alcian blue staining method, Schiff-positive inclusions accumulated in the cortex and medulla of rats with diabetes under experimental conditions, which made it possible to interpret the morphological changes caused by it.

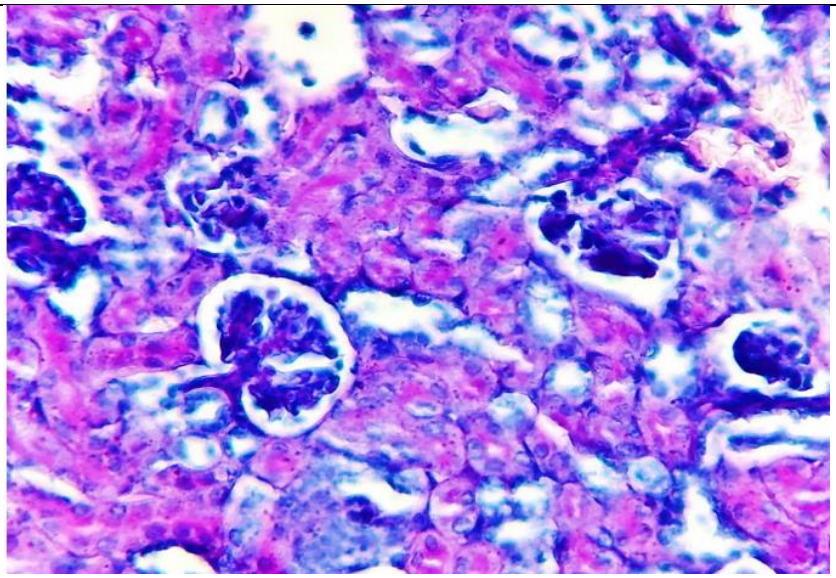


Figure 5. Results obtained on the 90th day of the study. Kidney tissue. It was found that sparse and coarse fibrous structures are formed around the cavity of the renal cortex along the perimeter of the inner and outer surfaces of the balls. Schiff-positive inclusions are preserved in these foci, and foci of segmental necrosis and necrobiosis are determined in the epithelium of the ducts. The image is tinted in Alcian blue and has a size of 40x10.

On the 90th day of our experiment, an increase in the number of positive Schiff inclusions was found in the kidney tissue stained by the Alcian blue method; they were concentrated in the tubulointercytial areas and along the trochlea of the "miraculous mesh" area of the glomeruli and along the perimeter of the glomeruli. These changes were caused by an increase in acidic mucopolysaccharides, acidic type glycosaminoglycans in cellular and extracellular structures, the development of diabetic glomerulosclerosis, foci of peritubular sclerosis between the tubules, the accumulation of homogeneous structures with reticular and mucous mucus in the proximal and distal tubular space, as well as the detection of this type of structures in the distal tubular space. It was found that the process of diabetic glomerulosclerosis develops at different levels. In essence, this process is explained by a sharp accumulation of acidic mucopolysaccharides and a morphologically sharp formation of fibrous structures in cellular and extracellular areas and the creation of conditions for the development of foci of angiosclerosis around the vessels.

Conclusion: On the 90th day of our research work, along with the above-mentioned changes, a sharp decrease in the epithelium of the glomerulus and canal, which constitutes the majority of the parenchymatous elements, nodular sclerosis and sharply developed foci of collagen fibrous structures in the upper peripheral branches of the glomerulus are revealed. When examining most of the glomeruli measuring 4x10, it was revealed that 3/2 of them have glomerulosclerosis, the canals are deformed, the epithelial cells are sharply reduced, and the

coarse fibrous structures are enlarged. At the same time, foci of angiosclerosis and hyalinosis were found in the walls of most vessels.

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