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# MORPHOLOGICAL CHANGES OF THE RAT OFFSPRINGS' KIDNEYS IN DIABETES MELLITUS CAUSED BY STREPTOZOTOCIN

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## ABSTRACT

In children, usually type 1 diabetes mellitus ( DM), more often type 2 occurs. Advanced hyperglycemic nephropathies (HN), such as loss of filtration rate (LFR) in nephron, do not occur until puberty, renal biopsies show structural changes of HN within 1.5-5 years of onset of Type 1 DM. The earliest clinical sign of HN, such as increased albumin excretion in the urine, usually occurs in childhood and adolescence, and is an important opportunity to detect and treat early HN. Research on the issue of Type 1 diabetes has shown that HN is typical of a part of people with diabetes who are at high risk of early death, which increases the ability to detect, prevent and treat HN. Preliminary studies suggest that type 2 DM, which began in young adults, is associated with a higher prevalence of risk factors. Type 2 DM initiated in young people helps to conduct scientific research on a deeper understanding of risk factors, underlying mechanisms, and treatment options for HN.

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

## INTRODUCTION

DM is one of the most common chronic diseases among children and adolescents. There are currently more than 190,000 people with DM under the age of 20 in the United States and this number is predicted to double by 2050 . Type 1 DM has been a major form of disease in children and adolescents. However, the increase in obesity in children over the past twenty years has led to an increase in the incidence of Type 2 QD among children and adolescents.

It is known for a long time that QD will significantly increase its mortality, mainly as a result of its long-term complications. Those with Type 1 and Type 2 DM developed kidney diseases. These observations highlight the importance of HN as a population marker at high risk of death and, possibly, as a risk factor that directly contributes to excess mortality.

More severe stages of HN take decades to develop, so although rarely observed in childhood, kidney biopsies show structural changes typical of HN in adults and children 1.5-5 years after the onset of diabetes. This is evidenced by the fact that HN occurs soon after the onset of diabetes, and this short interval is very important for determining the course of the disease and performing therapeutic interventions, which, in turn, necessitates intensive and constant monitoring of Risk Factors in children and adolescents. Perhaps we have fewer available tools for early diagnosis of HN in children and adolescents than adults. Since DM in children has a heavy impact on the course of a child's life, it requires us to fully use all available tools and resources, to deeply understand their strengths and limitations, as well as to carry out scientific research on the development of new diagnostics tools and methods of treatment.

Despite its low overall prevalence compared to type 1 DM, an increase in Type 2 DM in young people presents a serious health problem for four reasons: Young people with Type 2 DM have a higher prevalence of risk factors for diabetic complications and death. Poor control of these risk factors indicates a faster progression of complications, higher mortality rates, and, more horribly, a stagnant progression of complications despite attempts to control the risk factors.

**The purpose of the study.**

Is to study the morphological changes of renal nephrons in the offspring of rats with streptocin diabetes mellitus.

**Materials and methods.** Laboratory white rats were used for the study:

3-day 68.4 gr±2.31 gr

10-day 79.74 gr±2.61 gr

30-day 106.5 gr±2.7 gr,

60-day 122.5 gr±2.7 gr,

90-day 153.6 gr±3.7 gr were obtained. The animals were kept at the Tashkent Medical Academy in the conditions of a standard vivarium, in plastic cages with no more than 10 pieces of wood sawdust in each cell. Vivarium diet and drinking regimen are standard.

To achieve the goal set before us, as well as to complete the tasks, white laboratory rats of 60 Vistar breeds were used as the object of the study, which were in the postnatal periods. Rats were divided into 2 groups. The first group was formed by an experimental group. In the experimental group, pregnant white laboratory rats were called an experimental model of diabetes mellitus by administering streptozocin (Streptozocin) in a citrate swab (Citratebuffersolution, 0.09 M, Sigma) at a dose of 40 mg/kg, with an injection volume of 0.5 ml, to the abdominal cavity once. The second group was a control group, in which 0.9% saline solution was injected into the abdominal cavity of rats. We analyze the blood and urine glucose levels in the automatic biochemical and enzyme immunoassay analyzer by periodically extracting blood from the tail vein according to the plan from rats in the control and experimental groups. Rats were rendered lifeless by decapitation during different periods of postnatal ontogenesis. We studied ontogenesis in the following periods of postnatal ontogenesis: days 3-10-30-60-90.

RESULTS AND DISCUSSION. It was determined that the width of the cortical layer of the rat kidney is 2.14 ± 0.44 mm, the width of the medulla is 1.42 ± 0.39 mm, and the length of the pyramidal papilla is 2.6 ± 0.69 mm. In the histological sections of the cortical labyrinth, the areas of renal corpuscles, cross-sections of proximal and distal convoluted tubules, and areas of dense staining of distal tubules are visualized. Kidney bodies are represented by capillary glomeruli, mesangial cells located between them, parietal and visceral sheets of the Bowman capsule, and the urinary cavity. In the area of the urinary pole, the urine (Bowman's space) passes into a proximal convoluted tubule covered with a single-layer cuboidal epithelium with a brush border. Between the proximal tubules, cross- sections of the distal convoluted tubules were detected in a much smaller amount. These structural elements had the following morphometric parameters.

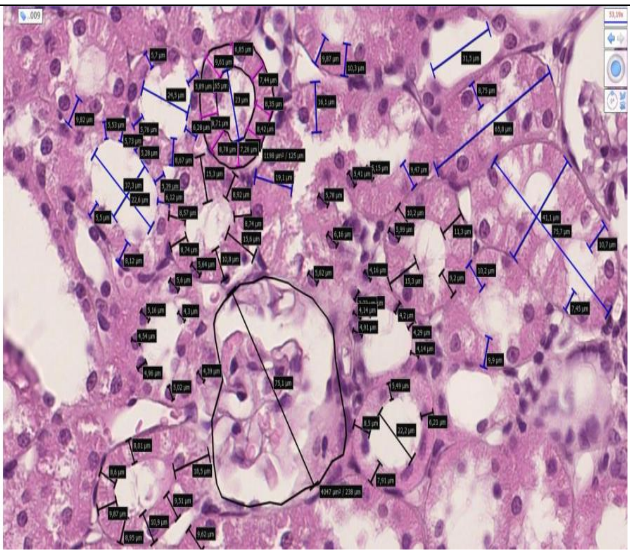

**Fig. 1. Experimental group. 60 days. The process of formation of a hemispherical cavity in the glomeruli, the sizes of the proximal tubules are shown. Scanned on NanoZoomer (REFC13140-21.S/N000198 /HAMAMATSU PHOTONICS/431-3196 JAPAN). Staining G.E. Magnification 20x10.**

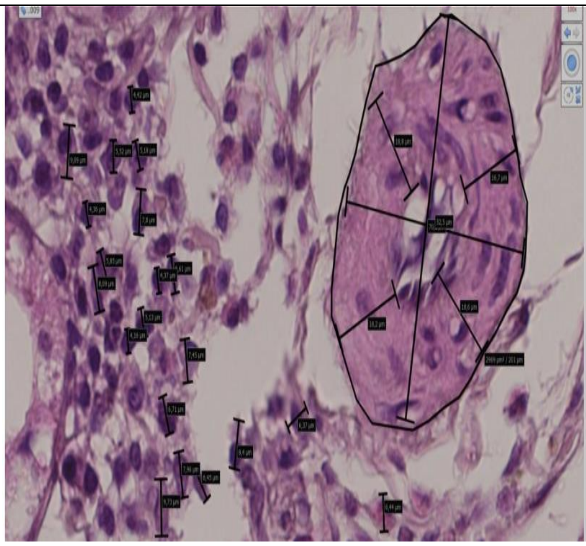

**Fig.2. Experimental group. 90 days. Perivascular sclerosis in the arcuate artery network, lymphocytic infiltration around. Scanned on NanoZoomer (REFC13140-21.S/N000198/HAMAMATSU PHOTONICS/431-3196 JAPAN). Staining by G.E. Magnification 20x10.**

**Morphometric parameters of white rat renal corpuscle, renal proximal and distal tubule**

**3-day-old white rat kidney corpuscle:**

Thickness of the parietal sheet of the Bowman capsule, mkm

0.375092±0.075533 (N=0.364167);Kidney ball area with Bowman capsule,mkm$^2$ 4630.537±720.3992 (N=4495.667);The area of the urinary cavity in the body of the kidney, mkm$^2$ 1343.807±295.3525 (N=1304.667); Kidney ball capillary network area, mkm$^2$3323.553 ± 501.2667 (N = 3226.75 )

**10-day-old white rat kidney corpuscle:**

Thickness of the parietal sheet of the Bowman capsule,mkm 0.400583±0.080667 (N=0.364167); Kidney ball area with Bowman capsule, mkm$^2$ 4945.233±769.3583 (N=4495.667); The area of the urinary cavity in the body of the kidney, mkm$^2$ 1435.133±315.425 (N=1304.667); Kidney ball capillary network area, mkm$^2$ 3549.425 ± 535.3333 ( N= 3226.75 )

**30-day-old white rat kidney corpuscle:**

Thickness of the parietal sheet of the Bowman capsule, mkm 0.40204±0.08096 (N=0.437);Kidney ball area with Bowman capsule, mkm2 4963.216±772.156 (N=5394.8); The area of the urinary cavity in the body of the kidney, mkm2 1440,352 ± 316,572 (N= 1565,6 ); Kidney ball capillary network area, mkm2 3562.332 ± 537.28 (N = 3872.1 )

**60-day-old white rat kidney corpuscle:**

Thickness of the parietal sheet of the Bowman capsule, mkm 0.37582±0.07568 (N=0.437); Kidney ball area with Bowman capsule, $mkm^2$ 4639.528±721.798 (N=5394.8); The area of the urinary cavity in the body of the kidney, mkm2 1346,416 ± 295,926 (N= 1565,6 ) ; Kidney ball capillary network area, mkm 3330.006 ± 502.24 (N = 3872.1 )

**90-day-old white rat kidney corpuscle:**

Thickness of the parietal sheet of the Bowman capsule, mkm 0.35834±0.07216 (N=0.437);Kidney ball area with Bowman capsule, $mkm^2$ 4423.736±688.226 (N=5394.8); The area of the urinary cavity in the body of the kidney, $mkm^2$ 1283.792 ± 282.162 (N= 1565.6 ); Kidney ball capillary network area, $mkm^2$ 3175.122±478.88 (N=3872.1)

**The thickness of the parietal sheet of the Shumlyansky-Boumen Capsule is in the mkm**

| | Days | Amount (M ± m) | | Norm |
|---|---|---|---|---|
| 1 | 3 | 0,375092 | 0,075533 | 0,364167 |
| 2 | 10 | 0,400583 | 0,080667 | 0,364167 |
| 3 | 30 | 0,40204 | 0,08096 | 0,437 |
| 4 | 60 | 0,37582 | 0,07568 | 0,437 |
| 5 | 90 | 0,35834 | 0,07216 | 0,437 |

**Glomerulus field with shumlyansky-Boumen capsule, in $mkm^2$**

| | Days | Amount (M ± m) | | Norm |
|---|---|---|---|---|
| 1 | 3 | 4630,537 | 720,3992 | 4495,667 |
| 2 | 10 | 4945,233 | 769,3583 | 4495,667 |
| 3 | 30 | 4963,216 | 772,156 | 5394,8 |
| 4 | 60 | 4639,528 | 721,798 | 5394,8 |
| 5 | 90 | 4423,736 | 688,226 | 5394,8 |

**Area of the urinary cavity, $mkm^2$**

| | Days | Amount (M ± m) | | Norm |
|---|---|---|---|---|
| 1 | 3 | 1343,807 | 295,3525 | 1304,667 |
| 2 | 10 | 1435,133 | 315,425 | 1304,667 |
| 3 | 30 | 1440,352 | 316,572 | 1565,6 |
| 4 | 60 | 1346,416 | 295,926 | 1565,6 |
| 5 | 90 | 1283,792 | 282,162 | 1565,6 |

**Glomerulus capillaries have an area of, mkm²**

| | Days | Amount (M ± m) | | Norm |
|---|---|---|---|---|
| 1 | 3 | 3323,553 | 501,2667 | 3226,75 |
| 2 | 10 | 3549,425 | 535,3333 | 3226,75 |
| 3 | 30 | 3562,332 | 537.28 | 3872,1 |
| 4 | 60 | 3330,006 | 502,24 | 3872,1 |
| 5 | 90 | 3175,122 | 478,88 | 3872,1 |

**3- day-old white rat were as follows:**

The diameter of the proximal tubules of the kidney (mkm) - 30.49658 ± 5.519083 (N= 29.60833 ); membrane of tubules ($mkm^2$ )- 15.67317 ± 5.58775 (N= 15.21667 ); the perimeter of canals ($mkm^2$ )- 112.1069 ± 32.84842 (N= 108.8417); area of canals ($mkm^2$ )- 182.9452 ± 84.80333 (N=177.6167);

The dimensions of the proximal tubules of the 10-day-old white rat kidney were as follows: The diameter of the proximal tubules of the kidney (mkm) - 32.56917 ± 5.894167 (N= 29.60833 ); membrane of tubules ($mkm^2$ )- 16.73833 ± 5.9675 (N= 15.21667 ); the perimeter of canals ($mkm^2$ )- 119.7258 ± 35.08083 (N= 108.8417 ); area of canals ($mkm^2$ )- 195.3783 ± 90.56667 (N=177.6167); The dimensions of the proximal tubules of the 30-day-old white rat kidney were as follows: The diameter of the proximal tubules of the kidney (mkm) - 32.6876 ± 5.9156 (N= 35.53 ); membrane of tubules ($mkm^2$ )- 16.7992 ± 5.9892 (N= 18.26 ); the perimeter of canals ($mkm^2$ )- 120.1612 ± 35.2084 (N= 130.61 ); area of canals ($mkm^2$ )- 196.0888 ± 90.896 (N=213.14); The dimensions of the proximal tubules of the 60-day-old white rat kidney were as follows: The diameter of the proximal tubules of the kidney (mkm) - 30.5558 ± 5.5298 (N= 35.53 ); membrane of tubules ($mkm^2$ )- 15.7036 ± 5.5986 (N= 18.26 ); canal perimeter ($mkm^2$ )- 112.3246 ± 32.9122 (N= 130.61 ); area of canals ($mkm^2$ )- 183.3004 ± 84.968 (N=213.14); The dimensions of the proximal tubules of the 90-day-old white rat kidney were as follows: Diameter of proximal tubules of the kidney (mkm) - 29.1346 ± 5.2726 (N= 35.53); the membrane of tubules ($mkm^2$ )- 14.9732 ± 5.3382 (N= 18.26 ); the perimeter of canals ($mkm^2$ )- 107.1002 ± 31.3814 (N= 130.61 ); area of canals ($mkm^2$ )- 174.7748 ± 81.016 (N=213.14);

**Proximal ducts diameter, mkm**

| | Days | Amount (M ± m) | | Norm |
|---|---|---|---|---|
| 1 | 3 | 18,47133 | 2,738083 | 17,93333 |
| 2 | 10 | 19,72667 | 2,924167 | 17,93333 |
| 3 | 30 | 19,7984 | 2,9348 | 21,52 |

| | | | | |
|---|---|---|---|---|
| 4 | 60 | 18,5072 | 2,7434 | 21,52 |
| 5 | 90 | 17,6464 | 2,6158 | 21,52 |

**Distal ducts-Lumenar membrane area, mkm$^2$**

| | Days | Amount (M ± m) | | Norm |
|---|---|---|---|---|
| 1 | 3 | 10,918 | 1,733833 | 10,6 |
| 2 | 10 | 11,66 | 1,851667 | 10,6 |
| 3 | 30 | 11,7024 | 1,8584 | 12,72 |
| 4 | 60 | 10,9392 | 1,7372 | 12,72 |
| 5 | 90 | 10,4304 | 1,6564 | 12,72 |

**Distal ducts primer, mkm$^2$**

| | Days | Amount (M ± m) | | Norm |
|---|---|---|---|---|
| 1 | 3 | 69,35333 | 8,119833 | 67,33333 |
| 2 | 10 | 74,06667 | 8,671667 | 67,33333 |
| 3 | 30 | 74,336 | 8,7032 | 80,8 |
| 4 | 60 | 69,488 | 8,1356 | 80,8 |
| 5 | 90 | 66,256 | 7,7572 | 80,8 |

**Dimensions of the distal tubule of the rat kidney nephron**

**Dimensions of the distal tubules of the 3 -day white rat kidney nephron :**

diameter of distal tubules, mkm - 18.47133 ± 2.738083 (N= 17.93333 ); membrane thickness of distal tubules, mkm$^2$ - 10.918 ± 1.733833 (N= 10.6 ); perimeter of distal tubules, mkm$^2$ - 69.35333 ± 8.119833 (N= 67.33333 ); area of distal tubules, mkm$^2$ - 341.5394 ± 58.02333 (N= 331.5917 );

**Dimensions of the distal tubules of the 10 -day-old white rat kidney nephron**

diameter of distal tubules, mkm - 19.72667 ± 2.924167 (N= 17.93333 ); membrane thickness of distal tubules, mkm$^2$ - 11.66 ± 1.851667 (N= 10.6 ); perimeter of distal tubules, mkm$^2$ - 74.06667 ± 8.671667 (N= 67.33333 ); area of distal tubules, mkm$^2$ - 364.7508 ± 61.96667 (N= 331.5917 );

**Dimensions of the distal tubules of the 30 -day-old white rat kidney nephron**

diameter of distal tubules, mkm - 19.7984 ± 2.9348 (N= 21.52 ); membrane thickness of distal canals, mkm$^2$ - 11.7024 ± 11.8584 (N= 12.72 ); perimeter of distal tubules, mkm$^2$ - 74.336 ± 8.7032 (N= 80.8 ); area of distal tubules, mkm$^2$ - 366.0772 ± 62.192 (N= 397.91 );

**Dimensions of the distal tubules of the 60 -day-old white rat kidney nephron**

diameter of distal tubules, mkm - 18.5072 ± 2.7434 (N= 21.52 ); membrane thickness of distal tubules, $mkm^2$ - 10.9392 ± 1.7372 (N= 12.72 ); perimeter of distal canals, $mkm^2$ - 69.488 ± 8.1356 (N= 80.8 ); area of distal tubules, $mkm^2$ - 342,2026 ± 58,136 (N= 397,91 );

**Dimensions of the distal tubules of the 90 -day-old white rat kidney nephron**

diameter of distal canals, mkm - smembrane thickness of distal tubules, $mkm^2$ - 10.4304 ± 1.6564 (N= 12.72 ); perimeter of distal tubules, $mkm^2$ - 66.256 ± 7.7572 (N= 80.8 ); area of distal tubules, $mkm^2$ - 326.2862 ± 55.432 (N= 397.91 );

**WHITE MORPHOMETRIC INDICATIONS OF THE PROXIMAL AND DISTAL PARTS OF THE RAT NEPHRONE VELE (GENLE VELE)**

**Morphometric indicators of proximal parts**

**30 daily Dimensions of the proximal part of the white rat nephron loop:**

diameter of the proximal part of the nephron loop, mkm - 20.7276 ± 2.024 (N=22.53); membrane of the proximal part of the nephron loop, $mkm^2$ - 12.8432 ± 2.6036 (N=13.96); the perimeter of the proximal part of the nephron loop, $mkm^2$ - 91.1628 ± 8.1328 (N= 99.09 ); the area of the proximal part of the nephron loop, $mkm^2$ - 551.632 ± 97.336 (N=599.6);

**60 daily Dimensions of the proximal part of the white rat nephron loop:**

diameter of the proximal part of the nephron loop, mkm - 19.3758 ± 1.892 (N=22.53); membrane of the proximal part of the nephron loop, $mkm^2$ - 12.0056 ± 2.4338 (N=13.96); the perimeter of the proximal part of the nephron loop, $mkm^2$ - 85.2174 ± 7.6024 (N= 99.09 ); the area of the proximal part of the nephron loop, $mkm^2$ - 515.656 ± 90.988 (N=599.6);

**90 daily Dimensions of the proximal part of the white rat nephron loop:**

diameter of the proximal part of the nephron loop, mkm - 18.4746 ± 1.804 (N=22.53); membrane of the proximal part of the nephron loop, $mkm^2$ - 11.4472 ± 2.3206 (N=13.96); the nephron loop, $mkm^2$ - 81.2538 ± 7.2488 (N= 99.09 ); the area of the proximal part of the nephron loop, $mkm^2$ - 491.672 ± 86.756 (N=599.6);

**Morphometric indicators of distal parts**

**30 daily Dimensions of the distal part of the white rat nephron loop:**

diameter of the distal part of the nephron loop, mkm - 12.6224 ± 1.7112 (N= 13.72 ); membrane of the distal part of the nephron loop, $mkm^2$ - 8.5652 ± 0.6624 (N=9.31); perimeter of the distal part of the nephron loop, $mkm^2$ - 49.2292 ± 11.592 (N= 53.51 ); the area of the distal part of the nephron loop, $mkm^2$ - 165,002 ± 70,932 (N= 179,35 );

**60 daily Dimensions of the distal part of the white rat nephron loop:**

the nephron loop, mkm - 11.7992 ± 1.5996 (N= 13.72 ); membrane of the distal part of the nephron loop, mkm$^2$ - 8.0066 ± 0.6192 (N=9.31); perimeter of the distal part of the nephron loop, mkm$^2$ - 46.0186 ± 10.836 (N= 53.51 ); the area of the distal part of the nephron loop, mkm$^2$ - 154,241 ± 66,306 (N= 179,35 );

**90 daily Dimensions of the distal part of the white rat nephron loop:**

diameter of the distal part of the nephron loop, mkm - 11.2504 ± 1.5252 (N= 13.72 ); membrane of the distal part of the nephron loop, mkm$^2$ - 7.6342 ± 0.5904 (N=9.31); perimeter of the distal part of the nephron loop, mkm$^2$ - 43.8782 ± 10.332 (N= 53.51 ); the area of the distal part of the nephron loop, mkm$^2$ - 147,067 ± 63,222 (N= 179,35 );

## THE CIRCULATORY SYSTEM OF THE WHITE RAT KIDNEY MORPHOMETRIC INDICATORS

**Morphometric indicators of interlobular artery**

**Interlobular artery dimensions of 3-day-old white rat kidney:**

interlobular artery diameter, mkm - 107.3775 ± 18.62583 (N= 104.25 ); interlobular artery area, mkm$^2$ - 2833.53 ± 580.7483 (N= 2751 ); interlobular artery clearing area, mkm$^2$ - 998.585 ± 243.4233 (N= 969.5 ); interlobular artery perimeter, mkm$^2$ - 285.9967 ± 64.03167 (N= 277.6667 ); thickness of interlobular artery endothelium, mkm - 1.339 ± 0.223167 (N= 1.3 ); the thickness of the middle shell of interlobular artery, micron - 14.64317 ± 0.884083 (N=14.21667);

**Interlobular artery dimensions of 10-day-old white rat kidney:**

diameter of interlobular artery, mkm - 114.675 ± 19.89167 (N= 104.25 ); interlobular artery area, mkm$^2$ - 3026.1 ± 620.2167 (N= 2751 ); interlobular artery clearance area, mkm$^2$ 1066.45 ± 259.9667 (N= 969.5 ); interlobular artery perimeter, mkm$^2$ - 305.4333 ± 68.38333 (N= 277.6667 ); interlobular artery endothelium, mkm - 1.43 ± 0.238333 (N= 1.3 ); the thickness of the middle shell of interlobular artery, micron - 15.63833 ± 0.944167 (N=14.21667);

**Interlobular artery dimensions of 30-day-old white rat kidney:**

diameter of interlobular artery, mkm - 115,092 ± 19,964 (N= 125,1 ); interlobular artery area, mkm$^2$ - 3037.104 ± 622.472 (N= 3301.2 ); interlobular artery clearance area, mkm$^2$ 1070.328 ± 260.912 (N= 1163.4 ); perimeter of interlobular artery, mkm$^2$ - 306,544 ± 68,632 (N= 333,2 ); thickness of interlobular artery endothelium, mkm - 1.4352 ± 0.2392 (N= 1.56 ); the thickness of the middle shell of the interlobular artery, micron - 15.6952 ± 0.9476 (N=17.06);

**Interlobular artery dimensions of 60-day-old white rat kidney:**

diameter of interlobular artery, mkm - 107,586 ± 18,662 (N= 125,1 ); interlobular artery area, mkm$^2$ - 2839.032 ± 581.876 (N= 3301.2 ); interlobular artery clearance area, mkm$^2$ 1000.524 ± 243.896 (N= 1163.4 ); interlobular artery perimeter, mkm$^2$ - 286,552 ± 64,156 (N= 333,2 ); thickness of interlobular artery endothelium, mkm - 1.3416 ± 0.2236 (N= 1.56 ); the thickness of the middle shell of the interlobular artery, micron - 14.6716 ± 0.8858 (N=17.06);

**Interlobular artery dimensions of 90-day-old white rat kidney:**

diameter of interlobular artery, mkm - 102,582 ± 17,794 (N= 125,1 ); interlobular artery area, mkm$^2$ - 2706.984 ± 554.812 (N= 3301.2 ); interlobular artery clearance area, mkm$^2$ 953.988 ± 232.552 (N= 1163.4 ); interlobular artery perimeter, mkm$^2$ - 273.224 ± 61.172 (N= 333.2 ); thickness of interlobular artery endothelium, mkm - 1.2792 ± 0.2132 (N= 1.56 ); the thickness of the middle shell of interlobular artery, micron - 13.9892 ± 0.8446 (N=17.06);

**Morphometric indicators of the interlobular vein**

**Interlobular vein dimensions of 3-day-old white rat kidney:**

interlobular vein diameter, mkm - 76.632 ± 12.16258 (N= 74.4 ); cross-sectional area of the interlobular vein, mkm2 - 293.4642 ± 59.13917 (N= 284.9167); interlobular vein perimeter, mkm2 - 4829.842 ± 145.23 (N= 4689.167 );

**Interlobular vein dimensions of 10-day-old white rat kidney:**

interlobular vein diameter, mkm - 81.84 ± 12.98917 (N= 74.4 );cross-sectional area of the interlobular vein, mkm$^2$ - 313.4083 ± 63.15833 (N= 284.9167); interlobular vein perimeter, mkm$^2$ - 5158.083 ± 155.1 (N= 4689.167 );

**Interlobular vein dimensions of 30-day-old white rat kidney:**

interlobular vein diameter, mkm - 82.1376 ± 13.0364 (N= 89.28 ); cross-sectional area of the interlobular vein, mkm$^2$ - 314.548 ± 63.388 (N= 341.9); interlobular vein perimeter, mkm$^2$ - 5176.84 ± 155.664 (N= 5627 );

**Interlobular vein dimensions of 60-day-old white rat kidney:**

interlobular vein diameter, mkm - 76.7808 ± 12.1862 (N= 89.28 ); cross-sectional area of the interlobular vein, mkm$^2$ - 294.034 ± 59.254 (N= 341.9); interlobular vein perimeter, mkm$^2$ - 4839.22 ± 145.512 (N= 5627 );

**Interlobular vein dimensions of 90-day-old white rat kidney:**

interlobular vein diameter, mkm - 73.2096 ± 11.6194 (N= 89.28 ); cross-sectional area of interlobular vein, mkm$^2$ - 280,358 ± 56,498 (N= 341,9 ); interlobular vein perimeter, mkm$^2$ - 4614.14 ± 138.744 (N= 5627 );

**Morphometric parameters of the pritubular capillary of white rat kidney**

**The dimensions of the pritubular capillaries of the 3-day white rat kidney:**

Of pritubular capillaries , mkm - 6.626333 ± 1.87975 (N= 6.433333 ); of pritubular capillaries , mkm$^2$ 24.89167 ± 5.287333 (N= 24.16667 ); cross-sectional area of pritubular capillaries , mkm$^2$ - 40.994 ± 19.055 (N= 39.8 );

**The dimensions of the pritubular capillaries of the 10-day-old white rat kidney**:of pritubular capillaries , mkm - 7.076667 ± 2.0075 (N= 6.433333 ); of pritubular capillaries , $mkm^2$ 26.58333 ± 5.646667 (N= 24.16667 ); cross-sectional area of pritubular capillaries , $mkm^2$ - 43.78 ± 20.35 (N= 39.8 );

**The dimensions of the pritubular capillaries of the 30-day-old white rat kidney:** of pritubular capillaries, mkm - 7.1024 ± 2.0148 (N= 7.72 ); of pritubular capillaries , $mkm^2$ 26.68 ± 5.6672 (N= 29 ); cross-sectional area of pritubular capillaries , $mkm^2$ - 43.9392 ± 20.424 (N= 47.76);

**The dimensions of the pritubular capillaries of the 60-day-old white rat kidney:** of pritubular capillaries , mkm - 6.6392 ± 1.8834 (N= 7.72 ); of pritubular capillaries , $mkm^2$ 24.94 ± 5.2976 (N= 29 ); cross-sectional area of pritubular capillaries , $mkm^2$ - 41.0736 ± 19.092 (N= 47.76);

**The dimensions of the pritubular capillaries of the 90-day-old white rat kidney:** of pritubular capillaries , mkm - 6.3304 ± 1.7958 (N= 7.72 ); of pritubular capillaries , $mkm^2$ - 23.78 ± 5.0512 (N= 29 ); cross-sectional area of pritubular capillaries , $mkm^2$ - 39.1632 ± 18.204 (N= 47.76);

**Morphometric parameters of the glomerular capillary of white rat kidney**

**Morphometric parameters of 3-day-old white rat kidney ball capillary:**

the diameter of a white rat kidney ball capillary, mkm - 4.30025 ± 0.223167 (N= 4.175 ); the perimeter of the capillary of the kidney of a white rat kidney, $mkm^2$ - 14.935 ± 0.969917 (N= 14.5 ); the cross-sectional area of a white rat kidney ball capillary, $mkm^2$ - 14.73758 ± 1.2875 (N=14.30833);

**Morphometric parameters of 10-day-old white rat kidney ball capillary:**

a white rat kidney ball capillary, mkm - 4.5925 ± 0.238333 (N= 4.175 ); the perimeter of the glomerular capillary of a white rat kidney, $mkm^2$ - 15.95 ± 1.035833 (N= 14.5 ); the cross-sectional area of a white rat kidney ball capillary, $mkm^2$ - 15.73917 ± 1.375 (N=14.30833);

**Morphometric parameters of 30-day-old white rat kidney ball capillary:**

the diameter of the kidney ball capillary of a white rat, mkm - 4.6092 ± 0.2392 (N= 5.01 ); the perimeter of a white rat kidney ball capillary, $mkm^2$ - 16.008 ± 1.0396 (N= 17.4 ); the cross-sectional area of a white rat kidney ball capillary, $mkm^2$ - 15.7964 ± 1.38 (N=17.17);

**Morphometric parameters of 60-day-old white rat kidney ball capillary:**

the diameter of a white rat kidney ball capillary, mkm - 4.3086 ± 0.2236 (N= 5.01); the perimeter of the capillary of the kidney of a white rat kidney, $mkm^2$ -

14.964 ± 0.9718 (N= 17.4 ); the cross-sectional area of a white rat kidney ball capillary, $mkm^2$ - 14.7662 ± 1.29 (N=17.17);

**Morphometric parameters of 90-day-old white rat kidney ball capillary:**

the diameter of a white rat kidney ball capillary, mkm - 4.1082 ± 0.2132 (N= 5.01); the perimeter of the capillary of the kidney of a white rat kidney, $mkm^2$ - 14.268 ± 0.9266 (N= 17.4 ); the cross-sectional area of a white rat kidney ball capillary, $mkm^2$ - 14.0794 ± 1.23 (N=17.17);

**Conclusion:** the results of morphometric studies show that serious changes were found in indicators such as the thickness of the parietal sheet of the Shumlyansky-Bowmen capsule, the area of the renal glomerulus, the area of the urinary cavity in the renal body, the capillary net area of the renal glomerulus. In particular, the thickness of the parietal sheet of the Bowmen capsule (0.375092-0.075533 mkm compared to 0.35834-0.07216 mkm on the 3rd day of the experiment), the area of the renal glomerulus (4630.537-720.3992 mkm compared to 4423, 736-688,226 mkm on the 3rd day of the experiment, the area of the urinary cavity in the renal body (1283,792-282,162 $mkm^2$ compared to 1343,807-295,3525 $mkm^2$ on the 3rd day of the experiment), the capillary net area of the renal glomerulus (3175,122-478,88 $mkm^2$ compared to 3323,553-501,2667 $mkm^2$ on the 3rd day of the experiment,) was recorded to have declined. This is evidenced by the development and exacerbation of sclerotic changes in kidney tissue, as a result of which deep disorders occur in the functional state of the kidneys.

Thus, maternal rats experience significant morphological and functional changes in the kidneys of offspring born from these rats as a result of DM called under the influence of streptozotin. These changes will last until the 90th day of the life of rat children. The scientific data obtained during the experimental study can serve as the basis for studying the peculiarities of postnatal ontogenesis of children's kidneys, which occurred under the conditions of DM in the mother, during the screening process.

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