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MORPHOLOGICAL CHANGES IN TESTICULAR INTERSTITIAL ENDOCRINOCYTES IN DIABETICS MELLITUS UNDER CONDITIONS OF CHRONIC STRESS

МОРФОЛОГІЧНІ ЗМІНИ В ІНТЕРСТИЦІЙНИХ ЕНДОКРИНОЦИТАХ ЯЄЧКА ПРИ ЦУКРОВОМУ ДІАБЕТІ ЗА УМОВ ХРОНІЧНОГО СТРЕСУ

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Diabetes mellitus (DM) is one of the most urgent problems of clinical medicine due to its wide prevalence, clinical polymorphism, and severity of complications [3, 4]. In Europe, the general number of such patients is about 4% [4]. In Ukraine, 1.5 million patients (2.4% of the population) with diabetes are registered. However, the number of people with undiagnosed pathology exceeds this indicator by 3-4 times [4]. That is why a large number of military personnel may have moderate signs of diabetes or impaired glucose tolerance, and long-term stressors in combat conditions can cause the manifestation of the disease and the development of complications that, as a result, will lead to the inability to perform assigned tasks and will require long-term treatment.

Therefore, the aim of our study was to determine the morpho-functional changes in the testicular interstitial endocrinocytes in streptozotocin-induced diabetes mellitus (DM) under conditions of chronic stress.

Material and methods. 20 sexually mature white male rats (body weight 150-180 g) were used for the study; they were equally divided into 4 groups:

group 1 – with simulated STZ-induced DM and chronic immobilization stress; group 2 – with STZ-induced DM, group 3 – with chronic immobilization stress, group 4 – intact animals. STZ-induced DM was simulated by a single intraperitoneal injection of streptozotocin "SIGMA" (USA), which was diluted in 0.1 M citrate buffer with a pH of 4.5 (at the rate of 6 mg per 100 g of body weight). Simulation of CIS was carried out by placing the animal in a closed plastic container for 5 hours a day (Ukrainian patent for the invention No. 125623). In group 1 of animals, STZ-induced DM was simulated and starting from the 14th day of the experiment, CIS was simulated. The material was collected on the 56th day after the start of the experiment. Histological, electron-microscopic, biochemical and statistical research methods were used.

Results. In intact rats, testicular interstitial endocrinocytes are located in connective tissue layers between convoluted seminiferous tubules near vessels and fibroblasts. Their structure is characterized by an electron-dense cytoplasm, numerous elongated young mitochondria, densely packed cisterns of a smooth endoplasmic reticulum, and single secretory granules of moderate electron density. Their nuclei have a rounded or oval shape with diffusely scattered granules of euchromatin and are located mainly eccentrically.

In rats of experimental groups 1 and 2, pronounced destructive changes in the interstitial endocrinocytes were noted on the 56^{th} day of the experiment. A specific sign of damage was the accumulation of lipid droplets in them; usually they are not present in these cells in the control. The smooth endoplasmic reticulum was significantly expanded and destroyed. Several types of intracellular bodies were found exclusively in interstitial cells. Many of them resembled secondary lysosomes or dense bodies, while others appeared to be autophagocytic vacuoles. In addition, small, granule-containing lamellar structures were found; they were located inside a typical dense body or freely in the cytoplasm. Myelin-like structures were mainly observed in the cytoplasm of interstitial endocrinocytes or in mitochondria. It was often possible to trace the destruction of the plasmolemma of interstitial endocrinocytes with the release of organelles into the perivascular space. In the latter, a large number of macrophages with myelin-like bodies in the cytoplasm was observed around the interstitial cells. The above-mentioned changes indicate the destruction and phagocytosis of interstitial endocrinocytes and occur against the background of pronounced diabetic microangiopathy.

In the interstitial endocrinocytes of animals in group 3, disorganization and lightening of the mitochondrial matrix, a decrease in the number of secretory granules, and a focal expansion of the smooth endoplasmic reticulum were noted.

It is proved that dystrophic-destructive changes in the interstitial endocrinocytes (Leydig cells) of the testicles lead to a violation of the hormonal function of this organ. This is confirmed by the data of other researchers [1, 2, 7], who noted a decrease in the level of testosterone in the

blood of rats with DM, which may be associated with both a decrease in the synthesis of its precursors 17-β estradiol and progesterone [6] and a reduction of gonadotropins in the blood [8]. DM leads to a decrease in the blood of luteinizing hormone, which is responsible for normal functioning of Leydig cells [5]. It is known that insulin helps to maintain the level of luteinizing hormone on Leydig cell receptors. Luteinizing hormone deficiency provokes a decrease in the synthesis and secretion of testosterone by Leydig cells due to a decrease in the number of lutein-binding receptors on their plasmolemma in diabetic rats [5, 8].

Conclusions. Streptozotocin-induced diabetes mellitus by itself and in combination with chronic stress leads to pronounced destructive changes in the testicular interstitial endocrinocytes, and as a result, to a violation not only of the hormonal function of this organ, but also of the germinal function.

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