PARTICULAR QUALITIES OF WHITE FAT TISSUE IN RATS
ON THE BACKGROUND OF EXPERIMENTAL METABOLIC
SYNDROME

*Kuzmina I. Yu., Shutova N. A.*

*Kharkiv National Medical University,*

*Department of Pathological Physiology by D.E. Alpern, Ukraine*

Aim of research: Study the morphological praticular qualities of white adipose tissue in experimental metabolic syndrome (MS).

Material and methods. The study was conducted on 50 white rats of the male WAG / G Sto population at the age of 6 months, with a body weight of 240.0 ± 14.7 m, which were divided into 2 groups. The 1- st group included 25 rats, that made up the control group and which did not modeling MS. Group 2 consisted of 25 rats, they constituted the main group, with modeling MS lasted 6 weeks. MS was simulated by subcutaneous administration of Betaspan, 1 time per week at a dose of 20 gg / kg of mass dissolved in 0.2 ml of purified and sterile olive oil. Aurothioglucose was administered intraperitoneally once a week for 6 weeks at a dose of 10 gg / kg and was given a high-calorie diet rich in carbohydrates to rats. Using this method of modeling MS, “voluntary” hyperphagia develops in rats, as animals, along with the standard diet, are offered high-calorie foods.

We studied changes in the subcutaneous adipose tissue (SAT), which is located in the subcutaneous fat, mesenteric adipose tissue (MAT), which is located along the intestine, retroperitoneal (RAT), located in the kidneys and epididymal (EAT), which is located in the small pelvis around the testes or ovaries.

Animals were removed from the CO2 experiment by asphyxia. The adipose tissue mass of rats was determined by weighing on a balance, and its specific gravity was calculated (adipose tissue mass per 100 g of rat body weight). Two fragments were cut from each adipose tissue sample. The material was fixed in a 10% formalin solution. The micropreparations were studied on an Olympus BH-2 microscope (Japan) using a Baumer / optronic Type: CX05c camera and the Olympus DP-Soft (Version 3: 1) software, with which morphometric studies were performed. The average size of 500 fat cells was determined in which cell division was estimated by size (% of small cells (<50 gm), large (50-100 gm), and very large (100> gm) size). The obtained digital data were processed by methods of mathematical statistics using variation and alternative analysis.

Results and discussion. When modeling MS in rats, an increase in the body weight of animals by 25-40% and an increase in the specific gravity of adipose tissue by 3-5 times (p <0.01) occur. At the same time, the specific gravity of MAT increased by 2.2 times (p <0.01), EAT - 1.6 times (p <0.01), RAT - by 3.5 times (p <0.01), SAT - 5.5 times (p <0.01) compared with the 1-st (control) group of rats treated with a standard diet. Under review microscopy, subcutaneous and visceral adipose tissue in all observation groups had the structure of a white adipose tissue, consisting of a parenchyma, which was represented by fat cells - adipocytes, or lipocytes and stromal components. Adipocytes are different in size within one fat depot and can be divided into small (diameter up to 50 gm), large (diameter from 50 to 100 gm) and very large (diameter more than 100 gm) changes in the average size of adipocytes can be caused by two processes: hypertrophy and cell hyperplasia.

The mean adipocyte size of MAT in the 2nd group of rats was 60% higher (p <0.005), EAT - by 22% (p <0.01), RAT - by 16% (p <0.01) and SAT - by 12% ( p <0.05) compared with 1 group of rats. Adipocytes of small and medium sizes predominated in SAT and MAT, and cells of large and very large sizes prevailed in EAT and RAT.

Conclusions. The revealed morphological changes of adipose tissue in rats contribute to the understanding of the physiological features of adipocyte structure formation and the increase of adipose tissue mass of different localization in MS.

It has been shown that in MS, the change in adipose tissue mass in rats is due mainly to the hypertrophy of the cells of the MAT and the SAT, while the RAT and the EAT are due to hyperplasia.

*Key words:* experimental metabolic syndrome, adipose tissue, adipocytes of sizes.

*Ключові слова:* експериментальний метаболічний синдром, жирова тканина, розмір адіпоцитів