Morpho functional parameters of the knee joint under the influence of hypothyroidism.

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Relevance. Among endocrine diseases, thyroid diseases occupy the highest places in the world in terms of incidence. A number of targeted scientific studies are being conducted around the world to study the functional structure of the thyroid gland depending on age and gender. In this regard, it is necessary to study the factors leading to the development of hypothyroid syndrome in pathology of the thyroid gland, especially the state of hypothyroidism during pregnancy, the negative impact of hypothyroidism on fetal development, including the risk of serious pathological changes. In the musculoskeletal system, changes in the shape of the musculoskeletal system can lead to severe, potential disability of the growing organism. Degenerative-dystrophic changes in this area are of particular scientific and practical importance.

The purpose of the study. It consists of assessing the morphological growth and dynamics of development of the elements of the knee joint in experimental hypothyroidism at the stages of postnatal ontogenesis.

Material and methods. For the experiment, 40 mature white female laboratory rats weighing 200±17 grams were used. The rats selected for the experiment were kept in quarantine for 40 days and provided with sufficient food and water. To determine the amount of thyroid hormones, blood was taken from the tail vein of mother and pup rats and examined.

Rats were euthanized by decapitation on days 7, 14, 21-30 and 45 after birth. Tissues for histological examination were taken from the structures of the knee joint. Knee joint structures were fixed in 10% formaldehyde solution and paraffin blocks were prepared by dehydration in alcohols of varying pungency. Histological preparations, 5-8 μm thick, were prepared from paraffin blocks and stained with hematoxylin-eosin dye. For histological studies, elements of the rat knee joint (distal epiphysis of the femur, proximal epiphysis of the tibia, menisci, joint capsule, ligaments) were separated and placed in separate containers for freezing in 10% neutral formalin buffer. Soft tissue samples taken from experimental animals were immediately processed according to the standard. First, we cut off unnecessary derivatives in the section. The joint capsule in the sample, the ligaments, required for the study, were cut with scissors and examined at each observation period, and the organ metric parameters of the joint were assessed. The resulting fragments were dehydrated in alcohol of increasing concentration and fixed in 10% neutral formaldehyde.

Results. It is known that the congruence of the joint and its differentiation in the process of

ontogenesis depend on all elements of the joint and their harmonious development. Also, in postnatal ontogenesis it improves in accordance with the increase in the load force on the joint. During the observation period of the control group, during the morphological study of the articular surface of the knee joint of rats for histological examination, internal differentiation and normal formation of hyaline cartilage in the control animal corresponded to the observation period.

During this period, the animals of the comparison group showed basophilia, distributed symmetrically along the border of the basal layer of the articular surface, and the overlying shell of the joint consisted of thin fibrous structures. In certain areas of the surface of the joints, the thickness of the fibrous layer and the ordered distribution of the connective tissue structure were observed. In rats of the control group, the cambial layer of chondrocytes was quite thick, and the width of the joint space was observed.

In control animals, by day 45, significant signs of differentiation can be observed in the articular cartilage. Isogenic groups of round cells located in hyaline stems formed vertical columns. Signs of development, thickening or improvement of perichondral fibers indicate that the surfaces forming the joint are improving in accordance with age.

Conclusions. Histological changes are observed in the cartilage tissue of the surfaces of the knee joints of offspring born from pregnant rats with hypothyroidism, with an uneven distribution of chondrocyte differentiation in the outer, middle and inner layers.

In offspring born from mothers with hypothyroidism, a greater number of fibroblasts were observed among the cells of the synovial membrane of the knee joint, the presence of mitotic cells was detected, and an increase in the accumulation of fat cells near the vessels along the vessels. The relief of the tendons was found to lag behind the histological structure of the control animals (corresponding to the previous observation period).

On the 7th and 14th days of observation, the thickness of the hyaline thickets covering the bone surfaces of the knee joint in the experimental group compared to the control group was significantly different from the comparison values ($r < 0.05$). On the 21st day of observation, this indicator was 260±10.6 μm, and on the 45th day the thickness of the hyaline layer was 286±12.5 μm, which is 12% lower than the control value at that time.