STRUCTURAL CHANGES IN OSSEOUS AND CARTILAGINOUS TISSUES OF THE MANDIBLE UNDER EFFECTS OF HEAVY METALS SALTS ON THE BODY

Abstract. We have studied morphological changes in the osseous and cartilaginous tissue of the lower jaw of 72 experimental male albino rats whose bodies were influenced by the salts of heavy metals. We used anatomical, osteometric, spectrophotometric, histological, histochemical, morphometric, immunomorphological and statistical methods. It is shown that heavy metals salts cause the development of deep and persistent structural changes in the osseous and cartilaginous tissues of the mandible, which is accompanied by inhibition of growth, development of resorptive processes in the osseous tissue, reduced mineralization, depletion of inorganic matrix in macro- and microelements. Negative morphological changes develop in the process cartilage: zonal structure is impaired, proliferative activity of chondrocytes is inhibited.

Key words: osseous tissue, mandible, heavy metals salts.

Introduction. Due to the intensification of chemical and mining industries, the environmental pollution increased and the antropogenic impact of chemical xenobiotics, including salts of heavy metals (SHM) on the human body and a damage of different organs and systems have grown [1,2]. Hygienic, Epidemiological and clinical studies have shown that heavy metals play a vital role in the occurrence of many diseases of the human body [7]. However, the features of the reaction of the dental system hard tissues under the effects of SHM on the body have not been studied sufficiently, even though it is shown that amalogenesis gets impaired under the influence of SHM as well as the incidence of dental caries in the areas, where the content of these chemical pollutants in the environment is increased, grow [5,6]. However, the literature does not give a detailed analysis of structural changes in the dentin under the influence of SHM [8].

Objective: to establish the features of structural changes in osseous and cartilaginous tissues of the mandible under the effects of heavy metals salts on the body.

Materials and methods. The study was conducted on 72 laboratory mature male albino rats in accordance with regulations adopted by the European Convention for the Protection of vertebrate animals used for scientific purposes (Strasbourg, 1986) and the Law of Ukraine "On protection of animals against cruelty» № 3477-IV of 21.02.2006. The rats of the control and experimental groups were on a standard diet. The experimental animals received a combination of heavy metals found in excessive amounts in the northern Sumy region (increased amounts of zinc, copper, iron, manganese, lead, chromium). We used the anatomical, osteometric, spectrophotometric, histological, histochemical, morphometric, immunomorpho-
Results and discussion. In case of the SHM impact on the body, there is an inhibition of growth processes in the mandible and its formation. Lagging in osteometric indices of experimental animals compared to the intact rats remained at 5.02% - 8.58% (p <0.05).

At the microscopic level in the tissues of the lower jaw of experimental animals we observed changes of the structure, inhibiting proliferative activity of chondrocytes, which sometimes disappeared completely, atrophied or segregated in separate isogenic groups with very low proliferative activity. The number of cells reduced dramatically: they were irregularly shaped, the contours of chondrocytes were destroyed in some places, mitosis figures were hardly observed. The cells were mostly polygonal, there was a great number of layers of connective tissue and debris of damaged cells around them. The total width of the cartilage reduced by 4.89% (p <0.05).

There were signs of appositional growth inhibition in the compact substance as well as slower transformation of the membrane reticulated and osteoid osseous tissue into a splenial one. The ossification of intermediate osseous substance got impaired. The deformed and altered lines of adhesion, mosaic areas of calcification became clear. We marked disorders and inhibition of formation of secondary osteons, and, in contrast, an increased number of primary osteons, as evidenced by a decrease in their diameter and increased width of haversian spaces. The resorption cavities appeared.

Prospects for further research. Considering
the proposed mechanism of the development of changes in the osseous tissue under the influence of SHM to study the ways of correction of changes in the bone tissue.

References:


