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CHANGES OF THE CHEMICAL COMPOSITION AND STRUCTURE OF STRIATED MUSCLES IN RATS UNDER THE INFLUENCE OF LEAD, MANGANESE AND COOPER SALTS COMBINATIONS

The study was performed as a part of research work "Patterns of age and constitutional morphological transformations of internal organs and skeletal system in conditions of exposure to endo- and exogenous fa tors and ways for their correction" (state registration number 0113U001347).

Key words: striated muscle, heavy metals salts, rats.

ABSTRACT. Background. Heavy metals are dangerous in terms of their toxicity and prevalence in numerous countries. But now there is almost no data about changes in striated muscles in response to the toxic effects of a metal salts combination after their entrance to the body through the gastrointestinal tract. **Objective.** To determine the morphological features and dynamics of the changes in chemical composition of striated muscles under the influence of heavy metal salts combinations. **Methods.** The experiment was performed on 36 white Wistar rats. Animals were subdivided into experimental and control group (18 rats in each). Within 90 days the beings of experimental group were given drinking water with added $MnSO_4 \times 5H_2O$ (5 mg/l), $Pb(NO_3)_2$ (3 mg/l) and $CuSO_4$ (20 mg/l). The content of Cu, Zn, Pb, Fe, Mn, Cr was determined; some morphometric parameters: diameter of muscle fibers (DMF), width of endomysium (WE), width of perimysium (WP), surface area of nucleus (SN), surface area of mitochondria (SM), the volume of nucleus (VN), the volume of mitochondria (VM) were estimated. **Results.** Three months of intoxication leaded to increase of DMF on 10,17% ($p<0,05$), WE – on 20,99% ($p<0,001$), WP – on 14,31% ($p<0,001$), SN – on 12.54 % ($p<0,001$), SM – on 14,46% ($p<0,001$), VN and VM – on 19,34% ($p<0,001$) and 19,68% ($p<0,001$) respectively. Chemical analysis of skeletal muscles revealed an increase of copper content on 26,14% ($p<0,001$), lead – on 31,79% ($p<0,001$), manganese – on 15,26% ($p<0,001$). Index of iron have decreased on 5,82% ($p<0,05$), the level of zinc – on 6,1% ($p<0,05$). **Conclusion.** The influence of copper salts, lead and manganese on striated muscles induces the activation of sclerotic processes. In addition, the heavy metal intoxication is manifested by the signs of swelling, deformation and structural disorganization of functional parts of the symplast. Chemical and analytical study of the skeletal muscles showed a progressive reduction of iron and zinc, along with the rapid accumulation of drinking metal ions and salts.

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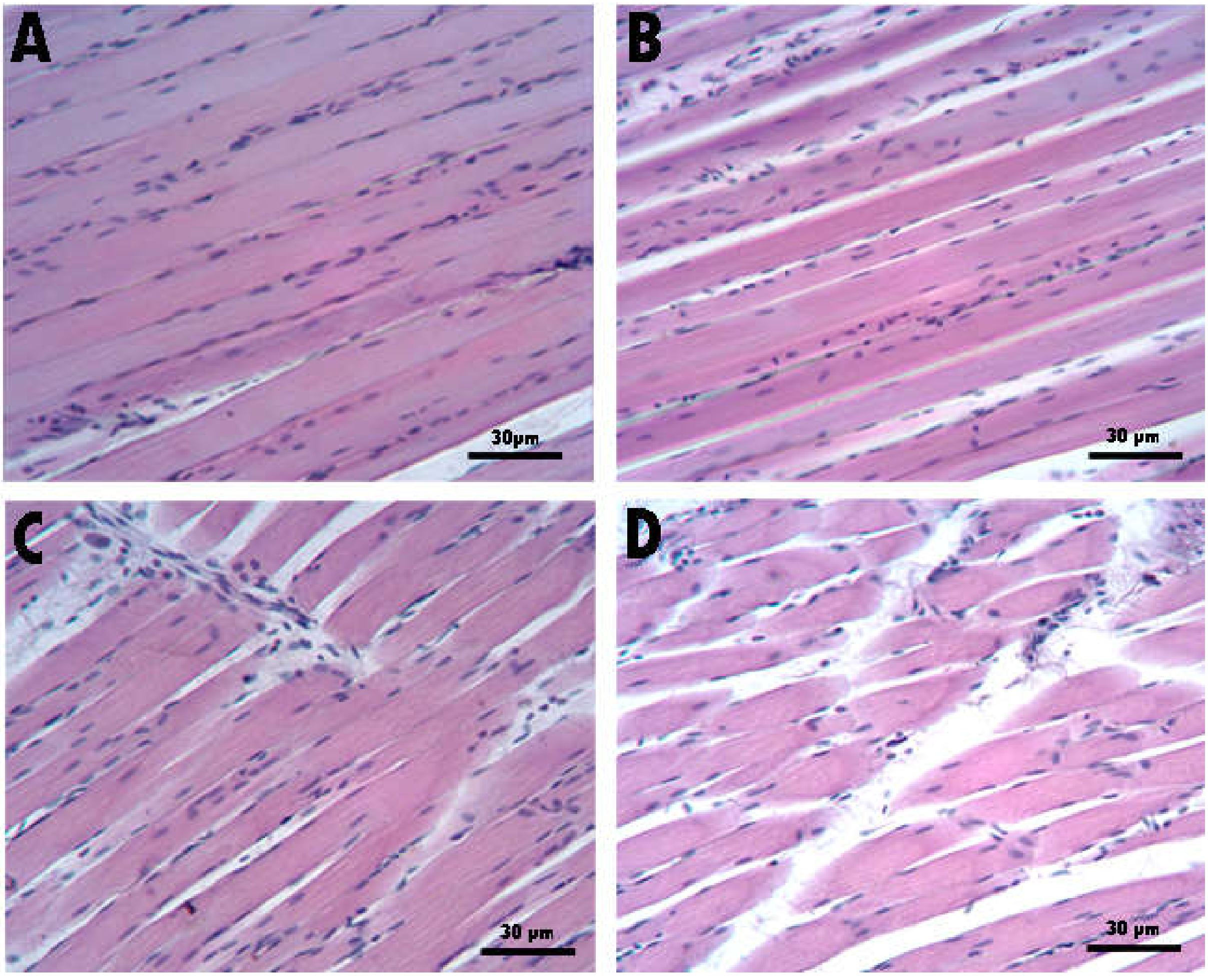

Fig. 1. Longitudinal section through the striated muscle of senile rat from the control group (A); after 1 month of experiment (B); after 2 months of experiment (C); after 3 months of experiment (D). Explained in text. Hematoxylin&Eosin staining.

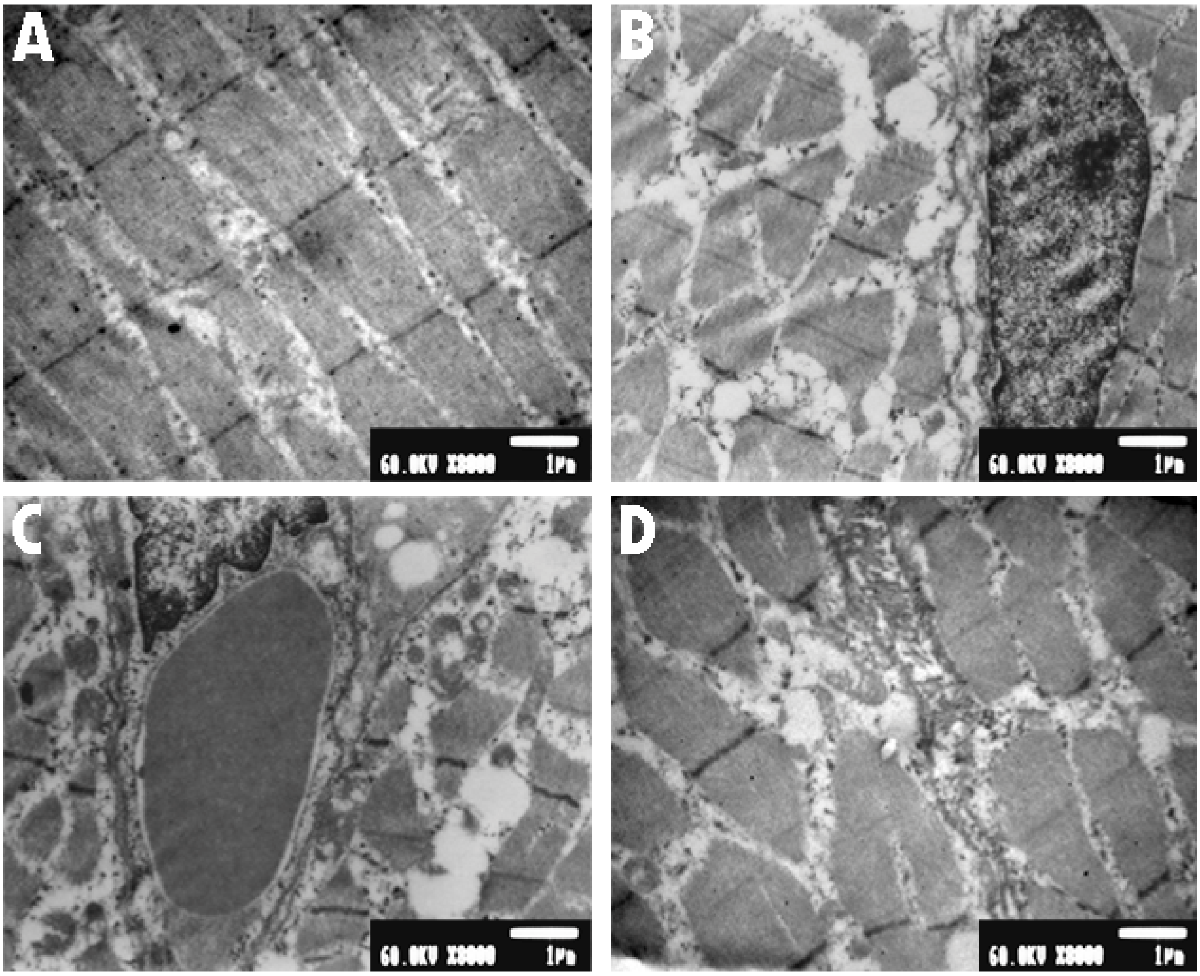

Fig. 2. Ultrastructure of the striated muscle of senile rat from the control group (A); after 1 month of experiment (B); after 2 months of experiment (C); after 3 months of experiment (D).

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