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Correction of myocardial changes on an animal experimental model with meldonim

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Prolonged hypoosmolar overhydration causes a volume overload necessitating cardioprotectors together with a complex of measures aimed at stabilizing the water and electrolyte balance. The content of water and electrolytes in the human body changes throughout life, so the body's response to the disorder of water and salt balance may be different depending on age. The fluid overload positively correlates with adverse outcomes in critically ill patients. One of the main tasks of modern cardiology is to find the means of leveling the influence of adverse factors on myocardium in different aged patients.

The aim of our study was the determination of morphological changes in the myocardium of old laboratory animals under the influence of severe hypoosmolar hyperhydration and attempt to correct the identified changes by means of meldonium.

Materials and methods: The experiment was conducted in accordance with the "European Convention of the Protection of Vertebrate Animals used for Experimental and other Scientific Purposes" (Strasbourg, 1986). 18 rats at the age of 22 months were divided into 3 series: 2 experimental and 1 control (6 in each). Animals of the first experimental series were modeling severe hypoosmolar hyperhydration by introduction of 10 ml distilled water three times a day through a tube during 25 days. Animals ate boiled unsalted food and were injected a synthetic analogue of antidiuretic hormone "Minirin" (Ferring) with drinking water 2 times a day at a dose 0.01 mg. In addition, the rats of the second experimental series were injected with meldonium intraperitoneally at a dose of 50 mg/kg once a day throughout the entire experiment. The animals of control series received normal drinking water and food and were injected the "Mynyrin"(Ferring) twice a day at a dose of 0.01 mg, considering the potential effects of vasopressin on the cardiovascular system. We measured the diameter of cardiomyocytes (DCMC) of both ventricles, the relative amount of cardiomyocytes (RACMC), connective tissue (RACT), and vessels (RAV), stromal-parenchymal ratio in the ventricles by the formula (RACT+RAV)/RACMC.

Results: In myocardium of rats administered meldonium, only isolated stromal hemorrhage are noted, while in myocardial samples of the first experimental series there are numerous hemorrhages. DCMC of left ventricle and DCMC of right ventricle are greater than control at 13.18% ($p<0.0001$) and 12.27% ($p<0.0001$) respectively. RAV does not change. RACT of left ventricle and RACT of right ventricle increase respectively by 3.72% ($p=0.0060$) and 5.23% ($p <0.0001$). RACMC of right ventricle is smaller than the control parameter by 0.63% ($p = 0.0015$).

Conclusion: In old animals, meldonium improves the vascular component of the myocardium. However, we have not found the positive effect of the drug on other studied parameters.