

Hypertrophy of cardiomyocytes can be considered an adaptive response that enhances cardiac performance by increasing the myocardial contractility under conditions of physical exercise. However, myocardial hypertrophy can lead to persistent decompensation of cardiac function.

The aim of the study was to determine the effect of meldonium on reproduction of cardiomyocytes against the background of their hypertrophy and polyploidy, which could expand the range and reliability of adaptation to overload.

Methods. The experimental animals were male Wistar rats, weighing 180–210 g, divided into three groups (18 rats in total). The animals swam for 15 minutes (Group 1 — light exercise), 30 minutes (Group 2 — moderate exercise), and 55–59 minutes (Group 3 — heavy exercise). During the experiment, meldonium was added to the rats' diet at a dose of 100–120 mg/kg of body weight.

Results. Moderate mode of physical exercise was the most beneficial for the rat myocardium. Heavy physical exercise led to structural impairments in the myocardium, its polyploidy, accompanied by persistent cardiomyocyte hypertrophy and a decrease in the proliferative potential of cardiomyocytes. Meldonium significantly altered the morphological parameters of the heart under heavy physical exercise. Its administration led to an increase in the number of binucleated cells, which became polyploid, while simultaneously reducing the number of hypertrophied tetraploid mononucleated cells.

Conclusion. The use of meldonium during heavy physical exercise reduces cell hypertrophy, increases the percent age of binucleated cardiomyocytes, and decreases the number of tetraploid mononucleated cells.