MORPHOFUNCTIONAL PECULIARITIES OF LUNG TISSUE UNDER INTENSIVE EXERCISE, INTERMITTENT HYPOXIA AND THEIR COMMON INFLUENCE

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Summary

Constructive effect of hypoxia is one of the mostly discussed question in pathophysiological scientific literature. It was emphasized that active mobilization of adaptive mechanisms took place under intermittent hypoxia (IH) — interchanging of hypoxic and normoxic influences on the organism. But, adaptive mechanisms on the tissue and cell levels during IH are not sufficiently investigated. The importance of such a study is connected with necessity of increasing of adaptive possibilities to different external factors, particularly, to intensive exercise. In case of hypermetabolic hypoxia, optimal O2 consumption by organism is very important, so, morphofunctional state of lung tissue may be one of the key factors for work capacity increasing.

The aim of our study was to investigate the effects of physical exercise of different duration and IH as well as their common influence on morphofunctional state of lung tissue.

Experiments were carried out on adult male Wistar rats under acute and prolonged (4 weeks) exercise (swimming), 2 weeks-IH (breathing by 12 % O2 gas mixture) and their common influence during the first and the last weeks of training.

It was shown that acute exercise was accompanied by pronounced disturbances in air-blood barrier (ABB) ultrastructure with increasing of its thickness. Furthermore, significant structural changes were found in mitochondrium of lung tissue cells: demolishing, vacuolization etc. Different signs of destructive processes in lung tissue were demonstrated after endurance training of different intensity and duration.

Intermittent hypoxia was accompanied by ultrastructural changes in lungs conforming to the hypoxia degree and pointing out on the some adaptive processes development.

In case of a combined influence of exercise and IH in the first two weeks of training, there was shown the essential disturbances in lung ultrastructure, especially in mitochondria structure: near the 1/3 of organelles were destroyed.

Under the common using of IH and exercise during the last two weeks of training, the constructive effect of hypoxia was strongly pronounced: a decrease in ABB thickness and essential improvement of the mitochondrium state may promote the optimization of O2 supply to tissues and its consumption.