

High-intensity exercise training produces morphological and biochemical changes in adrenal gland of mice

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The effects of training are dependent on complex, adaptive changes which are induced by acute physical exercise at different levels. In particular, evidence shows that the hypothalamus-pituitary-adrenocortical axis, as well as the sympathoadrenomedullary system are mainly involved in mediating the physiological effects of physical exercise. The aim of the present study was to investigate, through a morphological and biochemical approach, the effects of training on the adrenal gland of mice, following two different protocols consisting of either low- or high-intensity training. Mice were run daily on a motorized treadmill for 8 weeks, at a velocity corresponding to 60% (low-intensity exercise) or 90% (high-intensity exercise) of the maximal running velocity previously determined by an incremental exercise test. We found that physical exercise produced an increase in the adrenal gland size compared with the control (sedentary) mice. Such increase was 31.04% for mice that underwent high-intensity exercise and 10.08% for mice that underwent low intensity exercise, and this appeared to be the result of an increase in the size of both the adrenal cortex and adrenal medulla. Morphological analysis of the adrenal cortex showed that both types of exercise produced an increase in cytoplasmic vacuoles in steroidogenic cells, appearing more abundant after high-intensity exercise. No change was found in the reticulate zone. In the adrenal medulla, despite the absence of morphological changes, immunohistochemistry for tyrosine hydroxylase, dopamine β -hydroxylase and phenyl-ethanolamine-N-methyltransferase demonstrated an increased immunopositivity for these catecholamine-synthesizing enzymes after intense exercise. These results were confirmed by immunoblot accompanied by densitometric analysis.

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