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Archival Issues

Volume 27, 2010
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Volume 24, 2007
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Effects of moderate physical exercise on blood and urine concentrations of cadmium and metallothionein in runners

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[Biol Sport](#) 2004; 21 (1):

ICID: 891956

Article type: Original article

IC™ Value: 10.26

Abstract provided by Publisher



The aim of the study was to investigate the effect of combined exposure to physical exercise and tobacco smoke on the human body. The selected groups of runners similar in age, weight, height and body mass index were subjected to physical exercise, 2000 m and 4000 m run. The study covered two groups composed of smokers and non-smokers, each of the 12 subjects. Protein, creatinine, cadmium and metallothionein concentrations were measured three times: before the run (A); 30 min after the run (B); and 24 h after the exercise (C). In the group of smokers, higher urine and blood concentrations of cadmium were found. In the group of smokers who ran 2000 m, a post-exercise decrease in blood cadmium concentration that maintained also 24 h after the exercise was observed. Urine cadmium concentration increased with its post-exercise decrease in blood. The changes in urine differed significantly between smokers and non-smokers, and they significantly depended on the distance covered by the runners. Metallothionein proved to be a very effective marker of changes occurring in the runners' body. Its statistically significant increase in urine of non-smokers was observed 30 min after the run, and the longer the distance the higher the increase. In urine of smokers, the decrease in metallothionein concentration was observed after the run, regardless of the distance covered. The results of the study provide evidence that metallothionein, due to its specificity, can be regarded as an essential antioxidant. They also proved that this protein is a useful marker to monitor physical effort and disorders of the pro- and anti-oxidative balance. A moderate physical exercise may be a good avenue to remove cadmium deposits resulting from the environmental exposure to this metal.

ICID 891956

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