The antioxidant effects of exercise in the hippocampus of mice are dose-dependent


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Introduction: The antioxidant benefits of exercise on the central nervous system are well known. In general, moderate amounts of exercise improves the brain redox status and cause beneficial neuroplasticity changes, as excessive amounts of exercise can oxidize the brain and bring functional impairment. Here, we evaluated whether these effects behave in a dose-dependent manner.

Material and Methods: Adult Swiss mice male of 8-18-week-old, weighing 35-40g were used with distinct weekly frequency of exercise: two (2x), three (3x) and five (5x) times per week. Initially, the animals were adapted in treadmill and were exposure on eight-week training. The time and speed was progressively increased in all groups and keep up to 10-50 minutes. 48h after the last session of exercise the hippocampus was removed for analysis of metabolism (lactate and succinate dehydrogenase) and oxidative damage (carbonyl content, TBARS levels, total thiol content). Results and Discussion: The increase In skeletal muscle mitochondrial activity showed a weak negative correlation ($r^2 = -0.6$, $F=28.65$, $P<0.05$) with the lowest blood lactate in trained animals compared to untrained controls, ($F_{3,19}=106.2$, $P<0.05$). Oxidation of lipids ($F_{3,19}=11.44$, $P<0.05$) and proteins ($F_{3,19}=40.85$, $P<0.05$) was significantly lower in trained animals than in sedentary ones. The significant increase in the levels of sulfhydryl occurred at all frequencies of exercise ($F_{3,19}=20.15$, $P<0.05$), and also showed a weakly positive correlation with muscle mitochondrial activity($r^2=0.36$, $F=25.25$, $P<0.05$).

Conclusions: These results suggest that the antioxidant benefits of exercise show dose-response properties in the hippocampus of exercised mice.

Key Words: 6 OHDA., Exercise., Oxidative stress., Hippocampus.

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