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Modulation of synaptic plasticity by short-term aerobic exercise in adult mice

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Highlights:

aerobic training induces strenght endurance and aerobic endurance increase

aerobic training promotes a potentiation of motor coordination

enhancement in synaptic plasticity depends on the training protocol proposed

motor acivity exerts positive effects on cognitive processes if the training load is adequate and appropriate recovery periods are respected

ABSTRACT

Physiological effects of different types, of continuous and interval aerobic training, have been largely described and studied in the adult man. It was previously indicated that interval training plays an important role in maximizing both peripheral muscle and central cardiorespiratory adaptations, permitting significant functional improvement even in healthy sedentary subjects. Since the outcome of different aerobic training trials on cognitive processes had never been evaluated, we compared, on an experimental mouse model, the effects of four training exercise protocols, named respectively C100, I 100, C50 and I50 depending on the volume and on the type of training proposed, continuous or interval method. Therefore, to asses quantitative and qualitative functional changes, we analyzed several physical parameters before and after 6 weeks training in all four groups with respect to the control sedentary animals and we studied synaptic plasticity, by extracellular in vitro recordings, in hippocampal mouse slices, a region involved in learning and memory processes. We found that all four protocols of exercise applied in this study exerted positive effects on both physical and training parameters inducing weight augmentation, strength endurance and aerobic endurance increase, and potentiation of motor coordination. However, the improvement observed failed to induce an enhancement in synaptic plasticity in three out of four exercise protocols and only in the slices from mice trained with the interval 50% volume exercise the long term potentiation increased with respect to the sedentary group. These findings suggest that motor activity exerts positive

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