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A new model of exercise training in mice: a preliminary study

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Physical exercise produces a variety of effects, which might result either beneficial or negative, depending on several factors such as exercise intensity and duration. In particular, exercise training consisting of a repetition of exercises bouts over time, generally results in enhanced work capacity, mainly due to metabolic and systemic adaptations aiming to re-establish and maintain a condition of homeostasis which is disrupted during each acute exercise session.

The present study, carried out in mice, shows preliminary data concerning the effect on general physical conditions and aerobic endurance capacity, namely body weight and lactate production, of two distinct training schedules both consisting of daily forced run on a treadmill for 8 weeks, but with a different intensity: a) brief sequences of intense exercise (at 90% of maximal velocity) interspersed with recovery periods (2 min running - 1 min recovery) (HIT); b) continuous exercise at moderate activity (corresponding to 60% of maximal intensity) (LOW).

Distance to run was fixed to 1,000 meters for both trainings. Sedentary mice were used as control (CON). Training was preceded by a first preliminary phase consisting of a period of adaptation to running on the treadmill, followed by an incremental exercise test, in order to determine, for each mouse, the maximal running velocity. CON mice performed the first phase but were leaved in their cages during the training.

At baseline conditions and during the training body weight (once a week) and plasma levels of lactate (at T1, T20, T40) were measured in exercising mice and compared with CON. For each mouse the total amount of food intake during the training was also measured.

At the end of the training we found that the increase in the body weight observed in HIT mice was higher than the increase found in CON mice, suggesting that high-intensity training produces a positive effect on the body growth. In contrast, in LOW mice body weight increased significantly less than CON mice, despite LOW mice had an higher total food intake than CON.

Moreover, plasma lactate was found significantly decreased in both exercising mice compared with CON, confirming the efficacy of the regular exercise in inducing muscular metabolic adaptation. This appeared more markedly in HIT mice, suggesting that a very intense exercise has a stronger impact on muscular metabolism.

Studies are in progress in order to investigate whether and at which extent these changes are accompanied by morpho-functional modifications in many peripheral organs and in the nervous system, as well.

Keywords: exercise training, lactate, body weight, treadmill, mice

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