

3P13 Effect of short-term running wheel training on glycogen and lactate metabolism in mice

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Purpose: Decrease in blood lactate concentration is one of the major effects of endurance training. It is reported that blood lactate concentration decreases after one week of short-term training without increase in oxidative capacity in working muscle. There might be some effect on glucose transporter (GLUT) and monocarboxylate transporter (MCT) after short-term training that decreases blood lactate concentration. In this study, we investigated effect of voluntary exercise for one week on glucose and lactate metabolism in mice.

Methods: Five-week-old male ICR mice were used. The mice were assigned randomly to either a sedentary control group (CR) or a voluntary exercised group with wheel running (RW) for a week. At the end of a week of voluntary exercise period, all mice did the same high intensity exercise (40m/min*2min). Blood and tissues were taken immediately after the exercise.

Results and Discussion: Immediately after the high intensity exercise, concentrations of blood and muscle lactate in RW mice were significantly lower than those in the CR mice. In RW mice, muscle glycogen concentration tended to be higher and blood glucose concentration was significantly lower than those in the CR mice. GLUT4 protein in the RW plantaris significantly increased compared with the CR. GLUT4 protein in the RW plantaris and soleus was positively and significantly correlated with average running distance. No significant differences were found in MCT1 and MCT4 protein between RW and CR. These results suggest that muscle and liver glycogenolysis and production of lactate during high intensity running were inhibited and the protein expression of GLUT4 is activated after one week of training using running wheel in mice.

Key words: lactate, mice, voluntary exercise, GLUT4, MCT

3P14 The effect of exercise-training on the generation of nitric oxide in pancreatic islet of Langerhans

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<Objective> Exercise-training reduces glucose-stimulated insulin secretion (GSIS) from pancreatic islets and beta-cells. We hypothesized that the mechanism including this reduced GSIS may involve changes in nitric oxide (NO) productions with altered expression and activity of NO synthase (NOS). **<Methods>** Wistar male rats were assigned to training group or control group. Rats in training group were subjected to ~90min of running at ~30m min⁻¹ for 9wk. Isolated islets were incubated with glucose (3mM or 15mM), and free insulin and NO were measured in islets free medium. The protein expression of either NOS or GLUT2 were evaluated by Western blotting. The activities of glucokinase and aconitase were calculated by measuring NADPH generations, and NOS activities by measuring [³H]-L-citrulline formation. **<Results and Discussion>** We found that exercise-training increased the NO release and the NOS activity. The expression of neuronal NOS (nNOS) was higher in exercise-trained rats than in sedentary-control rats. Exercise-training also decreased glucokinase activity and GLUT-2 expression. Our results indicate that Exercise-training could enhance NO production of islets with the increased activity and protein expression of nNOS, and could decrease both the activity of glucokinase and the expression of GLUT2. But, activity of aconitase, which is inhibited by ONOO⁻, was similar in exercise-trained and sedentary-control rats. Consequently, it's suggested that there might be some anti-oxidative adaptation in islet of exercise-trained rats. **<Keywords>** insulin secretion, exercise-training, nitric oxide