Exercise Biochemistry Review

Proceedings of IBEC 2018, Beijing, China, October 23-25
PO-055

Changes of trace elements in skeletal muscle and serum of rats after exercise-induced injury

Jingyun Liu,Qun Zuo
Shanghai University of Sport

Objective This study is to investigate the changes of trace elements (Cu, Fe, Zn, Se, Mg) in serum and skeletal muscle of rats after skeletal muscle injury induced by downhill running, and to find out the change regularity of trace elements in the body after exercise injury. To provide experimental basis for how to use trace elements supplements reasonably.
Methods Fifty-four healthy male Sprague-Dawley rats aged 8 weeks were randomly divided into two groups: control group (C, N=6) and exercise group (E, N=48, include: 0 h group, 6 h group, 12 h group, 24 h group, 48 h group, 72 h group, 1- week group and 2- week group). The rats in exercise groups run down a 16°incline at 16m/min for 90 minutes. At the end of the exercise, the rats were killed at 0 h, 6 h, 12 h, 24 h, 48 h, 72 h, 1 week and 2 weeks, respectively. The serum was got from the inferior vena cava blood and diluted by 1% nitric acid. The muscle was got from the right side of the rat's sural which were digested by concentrated nitric acid and 30% hydrogen peroxide in 75°Cwater bath for 20mins. The content of trace elements in muscle and serum were measured by inductively coupled plasma atomic emission spectrometry (ICP-MS). All the data are analyzed and processed by SPSS22.0 statistical software.
Results (1) The contents of trace elements in serum showed: Cu, Zn, Mg, Se decreased immediately after exercise, but the Cu still increased to reach a peak at 24h after decreasing, and after 2 weeks the content of Cu was slightly lower than pre-exercise level. However, the content of Zn did not elevate again, it continued declined to the lowest at 24h which was significantly lower than control group ($P < 0.05$). And after 2 weeks, Zn did not return to the pre-exercise level. The changes of Mg, Se in serum was not statistically significant. There is no difference between 0h and control groups in content of Fe, after that Fe decreased continually and appeared the least value at 24h, the differences between immediate group and control group were statistically significant ($P < 0.05$). Fe returned to the pre-exercise level after 2 weeks. (2) The contents of trace elements in muscle showed: Most of trace elements increased to the maximum level at 6 h, after that Mg, Fe, Cu decreased to the lowest value at 72 h which were significant lower than 0h group or 6h group ($P < 0.05$). ALL the trace elements were lower than pre-exercise level. There was no statistical difference in the content of Se in muscle.
Conclusions (1) The different changes of trace elements in skeletal muscle and serum after exercise injury may be due to the redistribution of trace elements caused by the body adaptability. (2) The most obviously changes of trace element in serum and muscle are Cu and Zn. Both of them did not return to the pre-exercise level after 2 weeks, it suggests that the supplement include Cu and Zn may play an important role in recovering after exercise-induced injury.