



Exercise Biochemistry Review

Proceedings of IBEC 2018, Beijing, China, October 23-25
PO-021

The Effect of Aerobic Exercise on Alternative Splicing of Lipin1 pre-mRNA and its isoforms

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Objective Obesity is one of a world-wide chronic diseases, which is the leading cause of cancer, T2D, cardiovascular disease other metabolic complications. Aerobic exercise as a moderate intervention, has potential mechanisms for the loss weight. Lipin1 as a key regulator of lipid metabolism is a member of the Lipin family. Through alternative splicing, Lipin1 exists two isoforms, Lipin1 α is mostly expressed in preadipocytes during the initial stages of differentiation, whereas the Lipin1 β mainly expressed in mature adipocytes, and is responsible for lipogenesis and adipocyte hypertrophy. The aim of our present study was to investigate the effect of aerobic exercise on the levels of Lipin1 α , Lipin1 β and splicing factor SFRS10.

Methods C57BL/6 mice were randomly assigned to control group (C, n=20) and obesity control group (O, n=20). After 4 weeks, mice were further assigned to normal control group (NC, n=10), and control exercise group (CE, n=10), O group (O, n=10) and obesity exercise group (OE, n=10). CE and OE were on aerobic exercised for 8 weeks. RT-PCR was generated to detect Lipin1 α , Lipin1 β and SFRS10 mRNA expression.

Results The results suggest that the level of lipin1 α mRNA was decreased in obesity group. With exercise, levels in CE and OE increased. Furthermore, Lipin1 β was increased in obesity group and decrease after aerobic exercise in both CE and OE. We also demonstrated the SFRS10, which can bind to lipin1 exon8 and regulate Lipin1 alternative splicing, had a lower expression in obesity group and higher expression in CE and OE.

Conclusions Our data suggest that aerobic exercise can reduce body weight by influencing lipin1 pre-mRNA alternative splicing, and change the expression of two isoforms. Besides aerobic exercise can also affect SFRS10 mRNA Levels and change the expression of Lipin1 isoform.