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The Effects of Aerobic Exercise on Alternative Splicing of PKC δ I pre-mRNA

Junzhen Shi, Jinfeng Zhao, Xuyang Bai, Baoai Wu
Shanxi University

Objective Alternative splicing of genes is the main way to produce large numbers of proteins, but the mechanism is unclear. The aim of this study was to evaluate the effect of aerobic exercise on PKC δ I pre-mRNA alternative splicing. Further, to explore the effect of aerobic exercise on SFRS10 concentration. Because the PKC δ 1 is involved in the regulation of adipocyte differentiation and splice factor SFRS10 regulates alternative of PKC δ 1, explore the mechanism of PKC δ 1 alternative splicing, understand the role of the alternative splicing variants, to provide the theory basis for the mechanism of aerobic exercise reduce the incidence of obesity.

Methods C57BL/6 male mice were randomly divided into normal quiet group, normal exercise group, obese and quiet group, and obese exercise group. The exercise group performed aerobic exercise for 8 weeks. The intensity of aerobic exercise was: running platform slope is 0, speed 10 m/min, 1 h/time, 1 time/day, 6 times/week for a total of 8 weeks. Immediately after exercise, the cDNA was extracted from liver and adipose tissue. The contents of PKC δ 1 and SFRS10 in liver and adipose tissue were determined by PCR and RT-PCR. Liver and fat were stained by oil red O staining to observe lipid droplet changes. And the mouse's Lee's index and blood lipids were determined.

Results Lee's index = $3\sqrt{(\text{body weight} * 1000) / \text{body length}}$, Lee's index of obese mice decreased significantly after aerobic exercise, in addition, after aerobic exercise, total cholesterol (TC), triglyceride (TG) and low density Lipoprotein cholesterol (LDL-C) also showed a downward trend ($P < 0.05$), while high-density lipoprotein cholesterol (HDL-C) increased ($P < 0.05$); oil red O staining results showed lipid droplets become smaller after aerobic exercise. The results of PCR and RT-PCR showed in the obese and quiet group than in the normal quiet group, the content of PKC δ 1-FL decreased, the content of PKC δ 1- Δ Exon9 increased, and the content of SFRS10 decreased. In the normal exercise group than in the normal quiet group and in the obese exercise group than in the obese and quiet group, the PKC δ 1-FL content increased, the PKC δ 1- Δ Exon9 content decreased, and the SFRS10 content increased.

Conclusions Aerobic exercise can significantly increase the content of PKC δ 1-FL and SFRS10. PKC δ 1-FL inhibits the formation of adipocytes, SFRS10 promotes the inclusion of PKC δ 1 exon 9, and there is a molecular mechanism of alternative splicing between PKC δ 1 and SFRS10.