Exercise training attenuates obesity-induced increases in expression of fibrosis-related factors in white adipose tissue

Takuya SAKurai, Junetsu Ogasawara, Takako Kizaki, Junichi Nagasawa, Shukoh Haga, Hideki Ohno

1Kyorin University, 2The University of Electro-Communications, 3University of Tsukuba

Purpose: In the present study, we examined effects of exercise training (TR) on high fat diet (HFD)-induced expression change of fibrosis-related factors in white adipose tissue (WAT).

Methods: Eight-week-old male C57BL/6J mice were divided randomly into three groups: 1) C mice: control mice; 2) HFD mice: mice given HFD for 4 months; 3) HFD-TR mice: mice given HFD with voluntary TR on running wheel for 4 months, and then, we investigated expression of mRNA for fibrosis-related factors, such as transforming growth factor (TGF)-β and tissue inhibitor of metalloproteinase (TIMP) in epididymal WAT.

Results and Discussion: Although no significant differences in epididymal WAT mass were observed between HFD and HFD-TR mice, TR significantly diminished the reduction of glucose sensitivity observed in HFD mice. Moreover, expression levels of mRNAs for TGF-β, TIMP1 and dermotopontin, which is reported to enhance bioactivity of TGF-β, in WAT of HFD mice were significantly higher than those of C mice, whereas TR definitely attenuated such HFD-induced increases. These results suggest that TR attenuates obesity-induced increases in expression of fibrosis-related factors in WAT.

Key Words: exercise training, obesity, white adipose tissue, fibrosis

Time is a key factor to increase SIRT1 expression by endurance training in the rat plantaris muscle.

Toshinori Yosihara, Ryo Kakigi, Yuri Takamine, Takao Sugiura, Hisashi Naito

1 Juntendo University, Inzai, Japan, 2 Yamaguchi University, Yamaguchi, Japan.

Purpose: To examine the effects of different intensities and times of endurance training on SIRT1 expression in the rat plantaris muscle.

Methods: Forty-two female 16-week-old Sprague-Dawley (SD) rats were divided randomly into control (CON, n = 9), short time (30 min) exercise at low (25-30 m/min, 0-3% incline, 30L, n = 9) and high (25-30 m/min, 0-18% incline, 30H, n = 8) intensity, and long time (90 min) exercise at low (90L, n = 9) and high (90H, n = 7) intensity groups. The training group rats were exposed to treadmill exercise 5 days per week for 10 weeks. After the training period, the plantaris muscles were removed and analyzed by Western blotting.

Results and Discussions: SIRT1 expression was increased significantly in both 90 min groups (90L and 90H) compared with the control. Moreover, the expression in 90H was significantly higher than in both 30 min groups (30L and 30H). The p-Akt and Hsp72 expressions were increased significantly in the training groups, and these increases were marked in both 90 min groups. Long-term endurance training increased the expressions of SIRT1 and its downstream targets. However, SIRT1 expression was affected more by exercise time than by its intensity.

Keywords: endurance exercise; protein kinase B; silent information regulator 2 protein