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Expression of Aromatase and Synthesis of Sex Steroid Hormones in Skeletal Muscle Following Exercise Training in Ovariectomized Rats

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Objective Age-related muscle wasting (sarcopenia) is accompanied by a decrease in estrogen levels which can compromise the health of aging women. Recent studies have shown that the key enzyme of estrogen synthesis (aromatase) is detected in the skeletal muscle. The purpose of this study was to investigate the effects of exercise on the expression of aromatase and the synthesis of sex steroid hormones in skeletal muscle following exercise training.

Methods Fourteen female ovariectomized rats were divided into two groups, treadmill running (n=7) and sedentary (n=7) group. Exercise training on a treadmill (25 m/min, 60 min/day, 6 days/week) for 5 weeks. Immunofluorescence assay was used to detect estradiol and aromatase levels in soleus muscle and plantar muscle. Detected the expression of AKT, Aromatase, FoxO1, MyoD protein level by Western blotting.

Results We found that in ovariectomized rats, exercise training significantly increased the soleus and plantar muscles mass. The level of aromatase expression and 17- β -estradiol (E2) were increased significantly in skeletal muscle following exercise training ($P < 0.05$). In addition, the down-stream Akt-FoxO1-MyoD signaling pathway was significantly regulated in both soleus and plantaris muscles following exercise ($P < 0.05$).

Conclusions These results demonstrate that exercise training increased the expression of aromatase and local estrogen production in skeletal muscle, which potentially influences skeletal muscle in ovariectomized rats through activation of Akt-FoxO1-MyoD signaling pathway.