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The effects of HIIT on ROS-AMPK- PGC-1 α pathway in skeletal muscle and VO_{2max} of ageing Wistar rats.

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Objective To observe the 16 weeks of HIIT intervention on SOD, ROS and its related factors AMPK and oxidation capacity PGC-1 α expression and the influence of the VO_{2max} and its change rule in the process of the natural aging rats, To explore the correlation between the expression of ROS, AMPK and PGC-1 α and the change of VO_{2max}; Furthermore, it provides a theoretical basis for HIIT to delay the reduction of aerobic capacity in skeletal muscle ageing.

Methods 58 male wistar rats (age: 32 weeks) were selected and randomly divided into quiet group (C) and HIIT intervention group (H). All rats were fed in the barrier environment. Each group of rats entered the animal laboratory for a week of adaptive feeding and exercise. VO_{2max} was tested and observed every two weeks in each group. Rats of group C don't exercise, group H at a rate of 50%, 70% and 90% VO_{2max} corresponding alternation of 50 min/day, 5 days/week, for 16 weeks of exercise intervention, and according to the VO_{2max} test results the exercise intensity. Both groups of rats in the intervention of 8 weeks, 16 weeks after the end of the 24 hours of materials, stripping rats soleus, SOD and content of ROS was tested by multifunctional enzyme mark, using western blot test the expression of AMPK and PGC-1 α . VO_{2max}, SOD, ROS test results and AMPK, PGC-1 α , and relative expression data were analyzed using SPSS for one way ANOVA.

Results The cardiopulmonary endurance of rats in group C and group H showed a decreasing trend in group C and group H during HIIT intervention, but the decrease trend in group H was slower than that in group C. 2. During 16 weeks aging, SOD expression of group C in the process of rendering first rise after falling, and expressed in 8 weeks SOD content was significantly lower than base value ($P < 0.05$), 16 weeks group C SOD levels higher than the base state. After 16 weeks of intervention, the expression of SOD in group H was relatively flat in the first 8 weeks, and the trend was in 8-16 weeks, and was significantly lower than 8 weeks in 16 weeks ($P < 0.05$). 3. The ROS content was significantly higher than basic state in 8 weeks and 16 weeks in the intervention process ($P < 0.05$), and the ROS content was significantly higher than 8 weeks ($P < 0.05$) at 16 weeks. The ROS content of group C and group H was significantly higher than that in the group at 8 weeks ($P < 0.05$). 4. The AMPK content in group C was significantly lower than that of the basic value ($P < 0.05$), and the AMPK content in group H was significantly higher than that in group C ($P < 0.05$). 5. After the intervention of 16 weeks, the content of PGC-1 α in group C and group H showed a decrease trend and significantly lower than the basic value ($P < 0.05$), but the content of group H was significantly higher than that of group C ($P < 0.05$). 6. The changes of AMPK, PGC-1 α and cardiopulmonary endurance were the same in all groups during the intervention.

Conclusions 1. 16 weeks of HIIT can effectively delay the decrease of SOD content in the aging rats, thus inhibiting the accumulation of ROS in the body. 2. 16 weeks of HIIT intervention can effectively delay the expression of VO_{2max} and AMPK and PGC-1 α in aging rats. 3. 16 weeks HIIT may delay the decrease of AMPK-PGC1 protein expression by inhibiting the accumulation of skeletal muscle ROS in the aging rats, thus inhibiting the decrease of VO_{2max}.