



## Exercise Biochemistry Review

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### The Research on the Effects of Resistance Training on the Stress of Skeletal Muscle Endoplasmic Reticulum and Mitochondrial Autophagy in Aging Rats

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**Objective** By establishing a resistance training model, the researchers observed the effects of resistance exercise on the endoplasmic reticulum stress and mitochondrial autophagy-related factors in aging rats and further discussed the physiological mechanism of resistance movement in preventing and delaying senile skeletal muscle decay .

**Methods** 20 adult rats and 20 aged rats were randomly divided into two groups. The adult group was divided into the control Group C and the Sports Group E Group, the elderly group were divided into the control group OC Group and the Sports Group OE Group, 10/group. The eight-week tail-loading ladder training method was used to intervene the suitable resistance training for rats in the exercise group. During this period, rats in the control group did not exercise any training activities and ate normally. The relative expression of PINK1, PARKIN, LC3, PERK/EIF2A and Caspase-12 mRNA in gastrocnemius muscle of rats were detected by quantitative PCR after the experiment. The expression of Pink1/parkin protein in gastrocnemius muscle of rats was detected by Western Blot method. High performance liquid chromatography was performed to detect the ATP production of rat gastrocnemius mitochondria, and the obtained data were collected and analyzed.

**Results** (1) Compared with group C, the expression of PINK1 protein and parkin protein of gastrocnemius muscle in OC Group decreased significantly ( $p < 0.05$ ). PINK1 protein and Parkin protein in OE Group increased significantly ( $p < 0.01$ ) compared with OC Group. (2) Compared with group C, the expression of Pink1 mRNA, PARKIN mRNA and Lc3 mRNA in OC group showed a downward trend ( $p < 0.05$ ), and the expression of Pink1 mRNA, PARKIN mRNA and Lc3 mRNA in Group E showed an ascending trend ( $p < 0.01$ ). Compared with OC, the expression of Pink1 mRNA, PARKIN mRNA and Lc3 mRNA in OE group increased and had significant difference ( $p < 0.01$ ). (3) Compared with group C, the expression levels of perk mRNA, eif2a mRNA and Caspase-12 mRNA in the gastrocnemius of rats in Group E were significantly lower ( $p < 0.01$ ), and the expression of perk mRNA in OC Group had a significant upward trend ( $p < 0.05$ ). Compared with OC Group, the expression levels of perk mRNA, eif2a mRNA and Caspase-12 mRNA in OE group showed significant decrease ( $p < 0.01$ ). (4) There was a small increase in mitochondrial ATP production in Group E rats and Group C, but there was no significant difference. The mitochondrial ATP production in Group C was significantly higher than that in OC Group, and had significant difference ( $p < 0.01$ ). After 8 weeks' training, the mitochondrial function of the OE group was restored to normal, and the ATP production in the OC group increased significantly, there was significant difference ( $p < 0.05$ ).

**Conclusions** The resistance training can improve the function of mitochondria and activate the autophagy, which can improve the abnormality of mitochondria autophagy caused by skeletal muscle decay. Resistance training can reduce the extent of endoplasmic reticulum stress, suggesting that skeletal muscle decay can be slowed down by prolonged exercise.