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Effect of Aerobic Training on the Exercise Capacity of Apelin Knock-out Mice

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Objective Aerobic training is considered to be an effective way to enhance the body's exercise capacity which is closely related to the improvement of skeletal muscle energy metabolism. And as a new myokine, apelin has been found to play a key role in regulating the energy metabolism of skeletal muscle. However, whether the loss of apelin gene affects exercise capacity and what role aerobic training play in it remains unknown. This study was designed to investigate the effect of apelin on exercise capacity during aerobic training and to provide a theoretical basis for the mechanism of aerobic exercise affecting exercise capacity.
Methods Male C57BL/6J wild type mouse(n=20) and apelin knock-out mouse(n=20) were assigned by random allocation to four groups(n=10): wild type control(WC), wild type exercised(WE), apelin knock-out control(KC) and apelin knock-out exercised(KE). Exercise training consisted of treadmill running 60 minutes/day ×6 days/week for 4 weeks. The training intensity corresponded to the 70-75% maximum oxygen uptake of mice. The running speed was 15m/min with an incline of +5° in the first 2 weeks and subsequently adjusted to 20m/min according to the maximum oxygen uptake in the last 2 weeks. On the day after training, all groups were forced to perform a incremental exercise test to exhaustion. This test was started with an incline of +5°and a speed of 10 m/min for 5 min. After this initial phase, the speed was progressively increased by 3m/min every 3 min until animal exhausted. The maximum running speed, movement time and distance were recorded during the test.
Results Compared with group WC, the maximum running speed, movement time and distance of group KC were significantly decreased($P<0.01$). And the maximum running speed, movement time and distance of group KE were clearly higher than those of group KC($P<0.01$). There is no significant difference between group WE and group WC, and between group KE and group WE.
Conclusions The exercise capacity of mice was significantly decreased because of knocking out the apelin gene, and the exercise ability of apelin knock-out mice can be clearly enhanced by aerobic training.