



Hydrogen-rich water inhibits mitochondrial oxidative stress and inflammation in the skeletal muscle after eccentric exercise

白话标题: 富氢水抑制离心运动后骨骼肌线粒体氧化应激和炎症反应

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摘要: BACKGROUND:It is unclear whether hydrogen-rich water can be used to protect skeletal muscle injury induced by eccentric exercise, as well as the relative mechanism. OBJECTIVE:To observe the effect of hydrogen-rich water on the mitochondrial oxidative stress and inflammation in rat skeletal muscle after eccentric exercise, and to investigate the relative signaling pathway of hydrogen-rich water. METHODS:Forty Sprague Dawley rats were randomly divided into four groups: control group, eccentric exercise group, eccentric exercise+saline group, and eccentric exercise+hydrogen-rich water group. Rats in three eccentric exercise groups were exercised on a motor-driven rodent treadmill at a speed of 16-18 m/min and a slope of-16° for 90 minutes per day. Rats in the eccentric exercise+hydrogen-rich water group were subjected to intraperitoneal injection of hydrogen-rich water (10 mL/kg) immediately after exercise; and rats in the eccentric exercise+saline group were administrated with normal saline after exercise. All the interventions lasted for 5 days. RESULTS AND CONCLUSION:Hydrogen-rich water intervention after eccentric exercise could markedly enhance the mitochondrial Sirtuin-3 expression, improve the mitochondrial membrane potential and activity of manganese superoxide dismutase, down-regulate the mitochondrial reactive oxygen species generation and mitochondrial DNA oxidative damage, thus inhibiting inflammatory cytokines expression, such as NLRP3 and interleukin-1 β . The results indicated that hydrogen-rich saline could directly scavenge reactive oxygen species. In addition, hydrogen-rich water could improve mitochondrial energy metabolism and antioxidant capacity through up-regulation of Sirtuin-3, which in turn inhibits eccentric exercise-induced mitochondrial oxidative stress and secondary inflammation in the skeletal muscle.