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The Role and Mechanism of Endocannabinoid System in Exercise-induced Antinociception

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Objective As we all know, exercise can enhance the will, improve the mood, and counteract the bad feelings of the body, but the cause and mechanism of action have not been clear. The endocannabinoid system is an important regulatory system in the central nervous system that regulates cognition, mood and behavior. Endocannabinoids can exert physiological regulation through cannabinoid receptor 1 (CB1) and cannabinoid receptor 2 (CB2). Cannabinoid receptors are widely distributed in the body and participate in the regulation of anti-nociceptive signals at multiple levels. This study will explore the role and mechanism of the endocannabinoid system in exercise-induced antinociception by literature research methods.

Methods Using endocannabinoid, exercise/sports and antinociception or emotion as keywords, using Pubmed, Medline, and Embase databases to search for nearly 15 years of research literature and the literatures from cross-references of journals, after excluding the literature that is not relevant to the research content, the 12 articles included were analyzed.

Results Exercise can activate the endocannabinoid system, the degree of activation is related to exercise intensity, and high-intensity exercise significantly increases endocannabinoid levels in the human body. Cannabinoid receptor 1 (CB1) and cannabinoid receptor 2 (CB2) are widely distributed in the nervous system including the central nervous system and the peripheral nervous system. When exercise activates the endocannabinoid system, the increased endocannabinoid in the circulatory system activates CB1 and CB2 receptors, promotes hyperpolarization of the nervous system cells, reduces the rate of excitable cell release, and inhibits neurotransmitters, and reduce nociceptive impulses, thereby the body produces anti-nociception. Pretreatment with endocannabinoid metabolic enzyme inhibitors (MAFP, JZL184) and endocannabinoid reuptake inhibitors (VDM11) can be extended and enhanced the antinociceptive effect of exercise. Pretreatment with endocannabinoid receptor antagonists (AM251 and AM630) will inhibit the antinociception induced by aerobic exercise in mechanical and thermal nociceptive tests.

Conclusions Exercise can enhance the level of circulating endocannabinoids, activate the endocannabinoid system through endocannabinoid receptors, and then induce the body to produce anti-nociceptive effects. The degree of activation is related to exercise intensity. Studying the role and mechanism of the endocannabinoid system in exercise-induced antinociception can provide a theoretical basis for exercise to improve depression, anxiety and other emotions, improve the sense of life and prevent mental disorders.