Caffeine does not induce dehydration and can support physical performance

Caffeine, when used in moderation, does not induce dehydration, electrolyte depletion, or hyperthermia, showed a review of U.S. scientists from the Departments of Kinesiology and Nutritional Sciences, Human Performance Laboratory in University of Connecticut, published in July in Exercise and Sport Sciences Reviews journal.

According to the article published in the magazine of the American College of Sports Medicine, contrary to popular beliefs that caffeine is a diuretic, and it may exacerbate dehydration and hyperthermia, its consumption does not result in water-electrolyte imbalances or hyperthermia and reduced exercise-heat tolerance.

Although caffeine is viewed by some health professionals as a mild diuretic that poses no harm to health or exercise performance, this perception is not supported by science. According to previously published review articles, caffeinated beverages affect body water balance similarly to water during exercise.

Three broad conclusions were drawn from an analysis of published medical and scientific literature (January 1966–March 2002) on the effects of caffeine on fluid balance by Maughan and Griffin: large doses of caffeine (above 250 mg) have diuretic action; single caffeine doses at the levels found in commonly consumed beverages have little or no diuretic action; regular caffeine users become habituated to the effects of caffeine, diminishing its actions.

According to Pat Kendall, food science and human nutrition specialist in Colorado State University Extension, caffeine is an alkaloid compound that stimulates cardiac muscle and the central nervous system and is absorbed and distributed throughout the body very rapidly. People commonly perceive caffeine to have desirable effects such as increased alertness and energy, enhanced mood, less fatigue and a boost in athletic performance.

Caffeinated beverages contribute to the daily water intake requirement. Consumption of caffeinated beverages, such as coffee or tea, has a similar effect on fluid balance to the consumption of pure water. Little or no evidence supports induction of dehydration or hyperthermia. On the contrary, caffeine was shown to be beneficial on physical exercise by acting both on muscle performance and mental focus.

Caffeine has wide-ranging physiological effects on the sympathetic nervous, muscular, endocrine, cardiovascular, pulmonary, and renal systems. It is an ergogenic aid - a substance that improves the capacity to do work or exercise. D. Costill and colleagues were the first to show in 1978 that 330 mg caffeine

administered one hour before exercise (at 80% of maximal oxygen consumption on a cycle ergometer) increased time to exhaustion.

Since then, the vast majority of published scientific studies have shown that caffeine prolongs time to exhaustion or enhances performance in prolonged, moderate- to high-intensity exercise lasting between 30 and 120 minutes. Because of its widespread use as an ergogenic aid and its ubiquitous availability, as of 2004 caffeine is no longer on the banned substance list of the International Olympic Committee (IOC).

Different caffeine-induced effects may be at work in different types of exercise. The exact mechanism of this ergogenic effect has not been identified, but plasma epinephrine rises after caffeine intake independent of plasma norepinephrine that may or may not rise. Hypotheses suggest that caffeine alters intramuscular pH, muscle force production, central fatigue, or tissue glycogen concentration.

Caffeine stimulates the central nervous system first at the higher levels, the cortex and medulla, and finally the spinal cord at higher doses. Mild cortex stimulation appears to be beneficial resulting in more clear thinking and less fatigue. Caffeine has been known to decrease fatigue during exercise, which plays a physical as well as psychological role in the performance of an athlete.

According to different theories about sport and caffeine:

o it has the ability to cause the body to burn more fat and fewer carbohydrates. Glycogen is the principle fuel for muscles, but fat is the most abundant resource that the body uses for energy. Caffeine forces the working muscles to utilize as much fat as possible. This delays the immediate depletion of glycogen. Studies show that in the first fifteen minutes of exercise caffeine has the potential to reduce the use of glycogen by some 50%. The saved glycogen can be used for the remainder of the workout where normally it would be entirely depleted.

o can enhance the mental focus of athletes. It is a recognized stimulant to the central nervous system. By slowing substances used to stop neuronal firing, caffeine can quicken reactions and increase mental awareness.

o may have the ability to strengthen muscle contractions. By transferring calcium, sodium, and potassium in the cells, membrane permeability increases. This in turn results in more powerful muscle contractions.

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