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# Caffeine and Athletes

Caffeine may be the most widely used and accepted stimulant in the world. It is found in a variety of plants, dietary sources (including coffee, chocolate, cocoa, and colas), and non-prescription medications. The average caffeine consumption in the USA is approximately 1000 mg. per day. Ingested caffeine is quickly absorbed from the stomach and peaks in the blood in 1 – 2 hours (1).

Evaluating the effects of caffeine on performance is often difficult through research because of the variability of the type of participants tested (sex, training levels, source of caffeine, habituated or caffeine naïve, etc.), exercise protocols (anaerobic exercise bouts or endurance exercise/time to exhaustion trials or time trials versus time to exhaustion), caffeine dosages, and the sensitivity of the cognitive test used (simple RT tests and number recall versus more complex information processing tests) (6).

## Benefits of Caffeine for Performance

Caffeine is considered to be an ergogenic “drug” with beneficial effects on both physical and mental performance with minimal side effects (7). Caffeine is thought to act as a central nervous system stimulant and have effects on cognitive psychomotor functioning, particularly during mental and physical fatigue, by enhancing alertness and vigilance. Caffeine may therefore play a role in all types of exercise in which concentration, reaction times (RT), and technical/tactical skills have a major influence on both physical and mental performance such as cycling, orienteering, Formula 1, and ultra endurance events (6).

Caffeine ingestion (3 – 9mg/kg bw) prior to exercise increases performance during prolonged endurance exercises and short-term intense exercises lasting approximately five minutes in the laboratory (5). This is true for both elite and recreational athletes. Caffeine does not appear to enhance performance during sprints lasting less than 90 seconds, although research in this area is still lacking (5).

The optimal dose of caffeine for maximizing the chance that exercise performance will be enhanced is about 3 – 6 mg/kg, where side effects are minimized and urine levels are legal (1).

## Other Benefits of Caffeine

In addition to the sports performance aspect, caffeine has been shown to positively affect an individual's health in the following areas (4):

- Alertness, mood change
- Alzheimer's and Parkinson's diseases
- Glucose levels and a lower risk of Type 2 diabetes
- Gallstones
- Liver function liver cirrhosis
- Decreasing LDL-cholesterol
- Providing antioxidants
  - Coffee beans and tea both contain phenolic compounds and antioxidant compounds. However, phenolic compounds can be lost during the roasting process. Medium roasted coffee maintains the most antioxidant activity (4).

## Other Concerns

### High Blood Pressure

Contrary to what you might expect, in hypertensive subjects, the prolonged administration of caffeine is not associated with a significant elevation in blood pressure (2,4).

### Dehydration

While athletes often refrain from caffeine use because of its role as a diuretic, caffeine consumption does not result in water-electrolyte imbalances, hyperthermia or reduced exercise-heat tolerance (2).

### Side Effects

The side effects of caffeine ingestion include anxiety, jitters, inability to focus, gastrointestinal unrest, insomnia, irritability, and, with higher doses, the risk of heart arrhythmias and mild hallucinations (1,7).

## Legalities

Effective January 1, 2004, the World Anti-Doping Agency (WADA), in conjunction with the medical commission of the International Olympic Committee, removed caffeine from the list of stimulants prohibited for use by athletes. This may be a reflection of the increased use of caffeine as a stimulant in supplements, sport drinks, and gels. These products, which may be larger and contain more caffeine, may be consumed in quantity by athletes. As noted earlier, caffeine is also found in a wide variety of other food products (7).

As a result of this new regulation, athletes in the Olympics do not need to be concerned with drinking caffeinated beverages and testing positive for the use of caffeine. However, WADA has placed caffeine on its monitoring list, meaning that caffeine levels in athletes are tested, and, if caffeine abuse increases, it may be returned to the prohibited list (8). On the other hand, the acceptable limit in sports, sanctioned by the National Collegiate Athletic Association (NCAA) in the U.S. is 15 ug/ml measured in the urine (1).

A large amount of caffeine can be ingested before reaching the banned limit. The odds of reaching the limit through normal caffeine ingestion are low, except where smaller volumes of coffee with very high caffeine concentrations are consumed (1).

## Bottom Line

1. Be aware of how much caffeine is in your food, drinks, and medicine, including nonprescription drugs. Do not use caffeine as a possible ergogenic aid, for the first time, during a competition.
2. First use caffeine during practice, and not in a competition.
3. Listen to your body. If you have any unwanted side effects, limit your intake.
4. Caffeine withdrawal can cause mood shifts, headaches, nausea, tremors, and fatigue (7). ■

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