

Caffeine

by Joseph Giandonato, MS, CSCS

Caffeine has been popularized by numerous cultures throughout the world for nearly a dozen centuries. Its use spans the globe and is a staple in the daily routines of billions of people. During the morning rush, coffee shops and convenience stores are mobbed by the masses needing a much needed energy boost to shake off morning grogginess caused by a lack of sleep. Caffeine is not only an ergogenic aid used amongst paper pushers and laborers, but athletes as well for increased mental acuity and physiological work capacity (1). Caffeine increased performance in a variety of continuums, including both submaximal steady-state aerobic exercise and maximal and supramaximal exertion via anaerobic cycling and weight lifting exercises (1).

Caffeine use has also shown increased maximal oxygen uptake or VO₂ in a study consisting of high level competitive cyclists (2). The cyclists who used the caffeine recorded significantly faster results and were able to ride for longer durations as opposed to the cyclists who took only the placebo (2). Additionally, the study found that caffeine benefits cognitive ability (2). An increase in physical and mental performance will impact sport, occupation, and most importantly, daily life.

In a study conducted by the US Army Natick Soldier Research Center, it was discovered that caffeine improves awareness (3). 200 milligrams of caffeine was given to participants, netting improvements in in three visual attention network functions (alerting, orienting, and executive control) (3). The effects were due to caffeine's adenosine-mediated effects on dopamine-rich areas of the brain, resulting in the recruitment of the visual attention network functions (3). The study also cautioned that amounts exceeding 200mg could potentiate mal-effects of visual attention network functioning (3).

Caffeine users also benefited from improved neuromuscular efficiency (4), according to researchers at McMaster University in Hamilton, Ontario. The study concluded that caffeine can enhance contractile force during submaximal contractions (3). This physiological response takes place due the triggering of calcium release from the ryanodine receptor, not by altering sarcoplasmic excitability (3).

Caffeine, like other stimulants, can elicit unwanted side effects when taken in excessive amounts. These side effects include nervousness and irritability to a potentially life threatening condition, Rhabdomyolysis (5), which is characterized by excessive synthesis of muscle fibers causing myoglobin to be released into the bloodstream, damaging the kidneys. However, when caffeine is ingested in moderate amounts, such as in the aforementioned studies, benefits ranging from increased energy and improved mental acuity are result. Caffeine offers a quandary of benefits for athletes and the general population alike, when taken in moderation.

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