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**Coffee, Caffeine & Fitness**

**By Jon Gestl**

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One look at a line at the local Starbucks in the morning and you don't need to be convinced of the huge amount of coffee consumption in the U.S. The National Coffee Association found in 2000 that 54% of the U.S. adult population drinks coffee daily. Guess there's nothing like the first double espresso in the morning to clear the cobwebs from our heads so we can face the day.

But what are the effects relating to fitness? If that grande-no-foam-double-whipped-extra-shot-no-fat latte gives us the get-up-and-go to start our day at work, will it do the same if we're headed to the gym?

#### Physiological Effects

The main ingredient in coffee that gives us that jolt is caffeine, a central nervous system stimulant. Caffeine is found naturally in coffee beans, tea leaves, and chocolate, and is a popular added ingredient in carbonated beverages and some over-the-counter medications such as cold remedies, diuretics, aspirin, and weight control aids. It is estimated that in the U.S., 75% of caffeine intake comes from coffee.

Caffeine stimulates the central nervous system by blocking adenosine, a neurotransmitter that normally causes a calming effect in the body. The resulting neural stimulation due to this blockage causes the adrenal glands to release adrenaline, the "fight or flight" hormone. Your heart rate increases, your pupils dilate, your muscles tighten up, and glucose is released into your blood stream for extra energy. Voila... you now have the caffeine buzz.

But wait...we're not done yet. Caffeine also increases dopamine. Dopamine activates the pleasure in parts of the brain. It has been suspected that this also contributes to caffeine addiction.

Physiologically, caffeine makes us you feel alert, pumps adrenaline to give you energy and changes dopamine production to make you feel good. Another espresso, anyone?

### Ergogenic Effects of Caffeine to Performance

In addition to various psychological and physiological benefits, numerous studies have documented caffeine's ergogenic effect on athletic performance, particularly in regard to endurance. Studies show that caffeine ingestion prior to exercising extended endurance in moderately strenuous aerobic activity. Other studies researching caffeine consumption on elite distance runners and distance swimmers show increased performance times following caffeine consumption.

Despite effects on endurance, caffeine produced no effect on maximal muscular force in a study measuring voluntary and electrically stimulated muscle actions. However, the same study did show findings that suggest caffeine has an ergogenic effect on muscle during repetitive, low frequency stimulation.

Caffeine's positive performance-enhancing effects have been well documented. So much so that the International Olympic Committee placed a ban leading to disqualification for an athlete with urinary limits exceeding 12 mg/mL. Roughly 600 to 800mg of caffeine, or 4 to 7 cups of coffee, consumed over a 30-minute period would be enough to exceed this level and cause disqualification. The National Collegiate Athletic Association has a similar limit, set at 15 mg/mL.

### Coffee: A Pre-Workout Drink?

Before you make Starbucks part of your pre-workout warm-up in order to harness the effects of caffeine, be aware that simply downing a grande may not give you similar benefits found in these studies. A recent Canadian study published in the *Journal of Applied Physiology* compared the effect of coffee and caffeine on run time to exhaustion. A group of nine men took part in five trials. Sixty minutes before each run, the men took one of the following: A placebo Caffeine capsules De-caffeinated coffee with caffeine added Regular coffee

Performance times were up to 10 times longer in subjects using the caffeine capsules, with no differences in times among the other trials. Since the level of caffeine absorption was similar during the caffeine trials, researchers concluded something in the coffee itself that interferes with caffeine's performance-enhancing effects. This makes sense considering that there are literally hundreds of compounds dissolved when coffee beans are roasted, ground and extracted. Results of this research suggest that if benefits of caffeine on endurance times are desired, caffeine capsules work better than coffee.

### Caffeine and Creatine Supplementation

Although caffeine has been shown to increase endurance time, further research shows it may actually blunt the effect of creatine, a popular and well-researched compound known for its consistent ergogenic effects. In a study evaluating the effect of pre-exercise caffeine ingestion on both creatine stores and high-intensity exercise performance, caffeine totally counteracted any effects of creatine supplementation. It was suggested that individuals who creatine load should refrain from caffeine-containing foods and beverages if positive effects are desired.

### The Downside of Caffeine

Despite coffee/caffeine's positive effects on psychological states and performance, there are numerous documented risks that must be considered when consuming caffeine, whether for performance-enhancing effects or simply as a part of daily dietary consumption.

Caffeine stimulates the central nervous system and can produce restlessness, headaches, and irritability. Caffeine also elevates your heart rate and blood pressure. Over the long-term as your body gets used to caffeine, it requires higher amounts to get the same effects. Certainly, having your body in a state of hormonal emergency all day long isn't very healthy.

Caffeine is also a diuretic and causes a loss of fluid, which then leads to a dehydrating effect. This is obviously not conducive to fitness activities such as resistance training, as fluid is needed for the transfer of nutrients to facilitate muscular growth. It is also important when considering the further loss of fluid while exercising in hot environments.

Perhaps the most important long-term problem is the effect of caffeine on sleep. The half-life of

caffeine in the body is about 6 hours. If you drink a big cup of coffee with 200 mg of caffeine at 4PM, at 10PM you still have about 100mg in your body. By 4AM, you still have 50mg floating in your system. Even though you may be able to sleep, you may not be able to obtain the restful benefits of deep sleep. What's worse, the cycle continues as you may use more and more caffeine in hopes of counteracting this deficit.

### Caffeinated Conclusions...

Though caffeine has some benefits in relation to exercise performance, risks have been documented. Most problems seem evident with very high consumption. The American Heart Association says that moderate coffee drinking (one or two cups per day) does not seem to be harmful for most people. As with everything else, moderation is the key to healthy caffeine consumption. Further research is needed to clearly determine whether the performance-enhancing benefits of caffeine outweigh the potential risks.

Jon Gestl, CSCS, is a Chicago personal trainer and fitness instructor who specializes in helping people get in shape in the privacy and convenience of their home or office. He is a United States National Aerobic Champion silver and bronze medalist and world-ranked sportaerobic competitor and editor of the fitness ezine "Inspired Informed and Inshape." He can be contacted through his website at

### **Coffee Caffeine: How Much Is In Your Cup?**

**By Matthew Hick**

## Coffee, Caffeine Fitness

Coffee is a complex mixture of chemical components of the coffee bean. Some of these components are partially destroyed by the roasting process; however, many of these components are not. Caffeine is one of the components that is not affected by the roasting process. With the addition of hot water, the caffeine is extracted from the coffee bean.

Caffeine was discovered in coffee in 1820. Caffeine is an alkaloid that acts as a mild stimulant. It increases the blood pressure, stimulates the central nervous system and the action of the heart and lungs, and promotes urine formation. It also acts as a diuretic and delays fatigue. Caffeine does have some positive side effects. It has been found to help treat migraines since it helps constrict the dilated blood vessels, therefore reducing the pain. It also has been documented to increase the potency of aspirin and to slightly relieve the affects of asthma attacks. It has been suggested that caffeine has been linked to possible cancers and birth defects. However, this has not been confirmed and there are no bans or warnings that have been issued by the US Food and Drug Administration (US FDA).

The amount of caffeine found in the coffee beans varies. On average, a regular cup of coffee contains approximately 90 to 150 mg of caffeine. Coffee brewed in a drip coffee maker has about 115 to 175 mg of caffeine while other coffee makers may brew coffee with about 80 to 135 mg. Typically, espresso has about as much caffeine as a regular cup of coffee. On average, a standard espresso cup would have about 100 mg of caffeine. However, the serving size for espresso is much smaller. The actual content of caffeine per milliliter in an espresso is much higher than in a regular brew. Also, caffeine is assimilated quicker when ingested in a concentrated dosage such as an espresso cup.

The amount of caffeine found in coffee blends will also vary. The following are examples of the caffeine content for different coffee blends:

–Brazilian Bourbons: contains 1.20% caffeine –Columbia Excelso: contains 1.34% caffeine –Columbia Supremo: contains 1.34% caffeine –French Roast: contains 1.22% caffeine –Costa Rican Tarrazu: contains 1.35% caffeine –Vienna Roast: contains 1.27% caffeine –Decafs: contains 0.02% caffeine

People hypersensitive to the caffeine found in coffee may decide to drink decaffeinated coffee. This way, they can still enjoy the great coffee taste, yet avoid the caffeine. Coffee can be "decaffeinated" by treating the green beans with solvents called chlorinated hydrocarbons. Once the solvents are removed, the beans are then roasted by ordinary procedures. Most people become accustomed to decaffeinated coffee and do not have to worry about the effects of caffeine.

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