

## **Caffeine and Energy Drinks**

Energy drinks are one of the most popular supplements in the American young adult population. One of the main reasons for use is weight loss although they are also used for their ergogenic (work enhancing) effect. The basic active ingredient in energy drinks is caffeine. Benefits have been seen with caffeine supplementation in doses ranging from 3 to 9 mg/kg body weight (equivalent to approximately 1.5-3.5 cups of automatic drip coffee in a 70-kg person). There does appear to be a difference in the ergogenic potential when caffeine is ingested in a food source (coffee or sports drink) compared with its anhydrous (contains no water) form. Although both forms have been shown to provide an ergogenic effect, the magnitude of performance improvements appears to be greater when caffeine is ingested in tablet form. To maximize the effectiveness of caffeine in an energy drink, supplement companies will often add several additional ingredients to exacerbate the stimulatory potential of caffeine.

### **ENERGY DRINKS AND WEIGHT LOSS**

Caffeine alone has been demonstrated to be effective in enhancing lipolysis, fat oxidation, and reducing glycogen breakdown; however, when it is combined with other thermogenic agents, its effectiveness appears to be magnified. Caffeine, in combination with ephedra, has been shown to be an effective supplement for increasing metabolic rate and stimulating fat loss. To maximize its effectiveness as an effective weight loss supplement, it appears that combining it with other herbal products helps potentiate the effect. Some of these products may include yohimbine, yerba mate extract, hordenine, phenylethylamine, and methyl tetradecylthioacetic acid. All of which have been shown to play a role in enhancing fat burning and increasing energy expenditure.

### **ENERGY DRINKS AND ATHLETIC PERFORMANCE**

Energy drinks are often used by athletes as a pre-exercise or pre-game supplement to either enhance the quality of their workout or improve athletic performance. Although caffeine has been used as an ergogenic aid for many years, consistent benefits have only been seen during endurance activities, in which time to exhaustion is often reported to increase. This delay in fatigue is thought to be related to caffeine's ability to alter exercise metabolism by enhancing fat oxidation, thereby preserving muscle glycogen content.

To increase the ergogenic potential of energy drinks, caffeine is often combined with other ingredients to provide a synergistic effect and increase the probability of a performance response. Several recent studies have demonstrated that a pre-exercise energy supplement can delay fatigue and improve the quality of a resistance training workout. The combination of 450 mg of caffeine, 1,200 mg of garcinia cambogia (50% hydroxycitric acid), 360 mg of citrus aurantium extract (6%), and 225 pg of chromium polynicotinate in an enriched coffee drink was shown to significantly enhance time to exhaustion during cycle ergometer exercise by 29% compared with subjects consuming decaffeinated coffee. However, within the same study, no difference in anaerobic power performance was noted between the consumption of the supplement and placebo (decaffeinated coffee). Improvements in the volume of training (defined as total number of sets x repetitions in a workout) from an energy drink were also confirmed by a recent study. They showed that an energy drink containing 110 mg of caffeine, 1,500 mg of L-taurine, 350 mg of glucuronolactone, and 5.2 g of branched-chain amino acids consumed 10 minutes before a

resistance exercise session enhanced acute exercise performance by increasing the number of repetitions and the total volume of exercise performed during that training session. The greater volume of training was also shown to augment both the growth hormone and the insulin response to exercise, indicating that consumption of this pre-exercise energy supplement enhanced the anabolic response to the training session. Energy drinks improve endurance performance and the quality of a resistance exercise workout; however, many athletes use energy drinks primarily for its stimulatory effect, specifically to enhance focus, alertness, and reaction time. The data to support this effect are limited but they do provide evidence to support many of these empirical claims made by athletes. The popular energy drink Red Bull has been shown to enhance cognitive performance through improved choice reaction time, concentration, and memory, which reflected an improved alertness.

### **SAFETY ISSUES RELATED TO ENERGY DRINK CONSUMPTION**

As mentioned earlier, caffeine is a mild stimulant and is commonly found in coffee, tea, chocolate, and soft drinks. The concentration of caffeine in these products has been reported to range from 40 to 150 mg. In contrast, the top selling energy drinks have caffeine levels that range from 75 to 174 mg. There is no evidence that the consumption of energy drinks in recommended serving amounts poses any harmful effects in otherwise healthy individuals. It should be noted that excessive caffeine consumption or caffeine sensitivity can cause a wide variety of nonthreatening effects such as anxiety, nervousness, irritability, restlessness, headaches, and diarrhea. So, it is important to establish the appropriate amount needed.

Many energy drinks contain sugar. Be advised that sugar is a carbohydrate and can add empty calories to the drink. For fat loss purposes, the amount of calories that are within the drink outweighs the benefits of the purpose of the drink if the intention for consuming is solely weight loss. Long-term speaking for habitual energy drink consumers, the increased sugar consumption can cause an unhealthy increase in insulin levels as well as adding on unwanted weight.

### **PRACTICAL APPLICATIONS**

For increased athletic performance, it is most beneficial to ingest an energy drink 30 to 60 minutes prior to activity to allow caffeine and other ingredients to be fully absorbed in the body, leaving the body in a more alert and energetic state. It is recommended that the upper limit of caffeine for those who are not caffeine sensitive is 6 mg/kg. However, research has shown that in dosages of both 2 and 6 mg/kg caffeine, similar ergogenic effects have been seen in both amounts during moderate activity. When using energy drinks for their ergogenic properties for fat loss and/or athletic performance, it is highly recommended to follow the labeled instructions on the bottle as most drinks are contraindicated for many individuals. If you are still unsure, please consult your physician. It should be noted that excessive caffeine consumption or caffeine sensitivity can cause a wide variety of nonthreatening effects such as anxiety, nervousness, irritability, restlessness, headaches, and diarrhea. So, it is important to establish the appropriate amount needed. Supplementing with caffeine at a dose of 3—6 mg/kg body mass 30—60 minutes before exercise has been shown to effectively increase different types of endurance performance. Increased caffeine intake can also increase oxidation of fat, spare glycogen, and reduce the athlete's perception of effort.

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