

## Raising the Red Flag on Some Energy Drinks

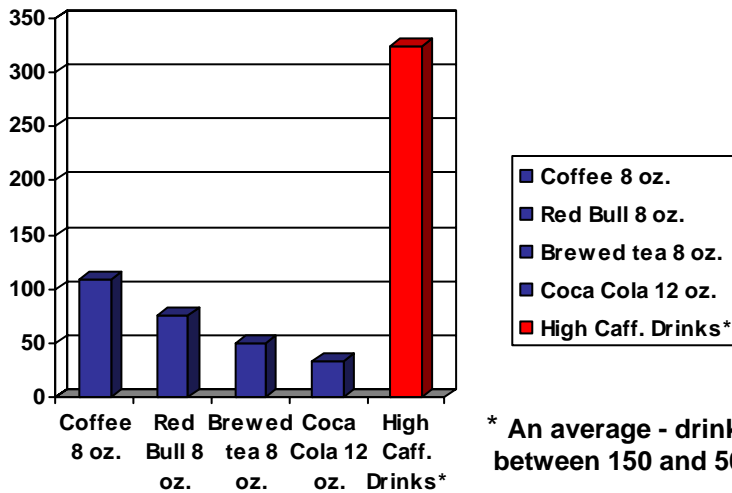
By: Dr. Lori Bestervelt, NSF International Senior Vice President & Chief Technical Officer

*This article discusses some of the risks associated with consuming energy drinks and the need for additional research to further examine these concerns.*

The popularity of energy drinks has increased considerably in the last few years. According to [Nutrition Business Journal](#),<sup>1</sup> the sports & energy drink industry “has experienced enormous growth over the last few years, and NBJ estimates that category sales have doubled since 2004.” Energy drinks and their purported energy performance benefits are available to pretty much everyone regardless of their dangers and side effects. In spite of their increasing popularity, there is still controversy over their safety and suitability of these products for daily use.

### Energy Drinks vs. Sports Drinks

Energy drinks should not be confused with sports drinks, such as Gatorade or Powerade intended to re-hydrate the body. Sports drinks provide sugars, which the body burns to create energy and replenish electrolytes, helping to maintain salt and potassium balances in the body. Energy drinks are formulated to deliver high concentrations of caffeine and other stimulants to give the drinker a rush of energy. Athletes use energy drinks to keep up their energy during intense physical activity and for an added edge during competition. To provide a comparison, 8 ounces of coffee has about 108 milligrams of caffeine, brewed tea has 50 milligrams and 12 ounces of coke has 34 milligrams. Eight ounces of Red Bull, which is part of our certified for sport program, has 75 milligrams of caffeine. However, very highly-caffeinated energy drinks have between 150-500 milligrams in 8 ounces as illustrated in the chart below.



\* An average - drinks range between 150 and 500 mg

Source: energyfiend.com

Consumption of caffeine at these rates can lead to caffeine intoxication, and at these high levels caffeine is a stimulant drug. There is an added risk of the additive effect of the other stimulants too, which cause concern for athlete’s health. Rather than re-hydrating their bodies, energy drinks may actually lead to dehydration. They are not formulated or designed

to replace lost fluids during exercise. There is also limited scientific evidence available that the consumption of these energy drinks can significantly improve physical and mental performance.

### **Health Risks**

Because of energy drinks' high levels of caffeine and other stimulant ingredients, such as guarana, green tea, yerba mate, yohimbine, bitter orange (synephrine or octopamine), vinpocetine, 5-hydroxytryptophan, methylphenylethylamine (5-HTP) and ginseng, either alone or in combination, athletes could be putting their health at risk by consuming such products. To make matters worse, when these stimulants are used in combination with each other (multicomponent formulation), and mixed into one beverage they can also be associated with serious cardiovascular issues. The bottom line is not enough is known yet about the combination of ingredients in energy drinks and their effects. Toxicological and safety tests have not been performed on many of the ingredients resulting in questions regarding the actual safety of these products.

### **Mania**

In addition to toxicological concerns, several of the components of energy drinks can potentially exacerbate or initiate manic episodes for patients. For example, a patient with no psychiatric illness previously experienced mania after two months of using 500 to 750 mg of "Panax ginseng," also called Asian or Korean ginseng.<sup>2</sup> Caffeine has also been associated with mania in a patient with no history of psychiatric illness. The patient increased caffeine consumption to approximately 1,000 mg daily. The patient's condition returned to normal within 30 days of stopping caffeine consumption.<sup>3</sup>

### **Drug Interactions**

Real concern may exist regarding ingestion of large amounts of ingredients found in energy drinks, particularly for patients with poorly controlled or undiagnosed psychiatric conditions. Additionally, many of these ingredients should not be used in combination with certain prescription and over-the-counter drugs as serious drug interactions have been reported.

### **Antidepressants**

5-hydroxytryptophan (5-HTP) is a precursor to the neurotransmitter serotonin, which is produced in the brain known to influence various cognitive and behavioral functions. The interaction of this compound with other medications is not well established, but there is the potential for harmful interactions with anti-depressant medications. Although warning labels often state not to take this supplement when on a monoamine oxidase inhibitor (MAOI), an individual who does not heed the warning label is at risk for interactions with this type of medication. It could make the medication inactive or depending upon the person's health could lead to other serious side effects.

### **Blood Thinners**

Vinpocetine, another ingredient found in some energy drinks, could cause serious drug interactions with aspirin, Plavix, Ticlid, Pentoxifyline, vitamin E, garlic, and ginkgo. This compound should not be taken with the drug Coumadin since it thins the blood and could cause excessive bleeding.

## **Blood Pressure**

Yohimbine is another ingredient often used in energy drinks. It can not be used in combination with tricyclic antidepressants, bupropion, phenothiazines, clonidine, and other drugs for lowering blood pressure, amphetamines or any other central nervous system stimulants. It can lower blood pressure too much and can also make the blood pressure medication inactive. Nasal decongestants or diet products containing phenylpropanolamine should be avoided to prevent dangerously high blood pressure and heart palpitations

## **Food Interactions**

It is also not recommended to consume cheese or red wine while taking yohimbine because this combination can result in high blood pressure levels that are unsafe. The range between an effective dose and a dangerous dose is very narrow; too large of a dose can be harmful and toxic.

## **Legislation**

In 2008, state lawmakers in Kentucky, Maine, and Michigan tried to pass legislation that would ban the sale of highly-caffeinated beverages to minors.<sup>1</sup> The bills did not pass, but they served as a warning to manufacturers of energy drinks.

## **Ongoing Research**

It is critical that coaches and athletes recognize the potential dangers of these products. Athletes who consume these beverages before strenuous exercise need to understand the diuretic and stimulant effects of the caffeine and other stimulant ingredients, which may lead to cardiovascular difficulties. Until the safety of this practice can be understood further, consumption of energy drinks prior to exercise should be used with extreme caution.

For additional information about supplements, please visit the [NSF Dietary Supplement Web page](#).

## **About the Author:**

Dr. Lori Bestervelt is the Senior Vice President & Chief Technical Officer of NSF International, a testing and certification organization committed to improving and protecting public health. Her areas of expertise include dietary supplements, nutritional biochemistry, toxicology and microbiology. As Chief Technical Officer at NSF, she oversees NSF's laboratory technical operations. Dr. Bestervelt was a Postdoctoral Fellow of Pathology and Experimental Toxicology at Parke-Davis Pharmaceutical Research Division. She received her Ph.D. in Toxicology, a M.S. Nutritional Biochemistry and her B.S., Microbiology/Immunology at the University of Michigan. She continues her relationship with the University of Michigan as a Lecturer for the Department of Biochemistry.

1: Pressure on Energy Drink Manufacturers: <http://nutritionbusinessjournal.com/news/01-20-pressure-on-energy-drink-manufactures/>

2: Engelberg D, McCutcheon A, Wiseman S. A case of ginseng-induced mania. J Clin Psychopharmacol. 2001; 5:535-7

3: Ogawa N, Ueki H., Secondary mania caused by caffeine. Gen Hosp Psychiatry. 2003; 25:138-9