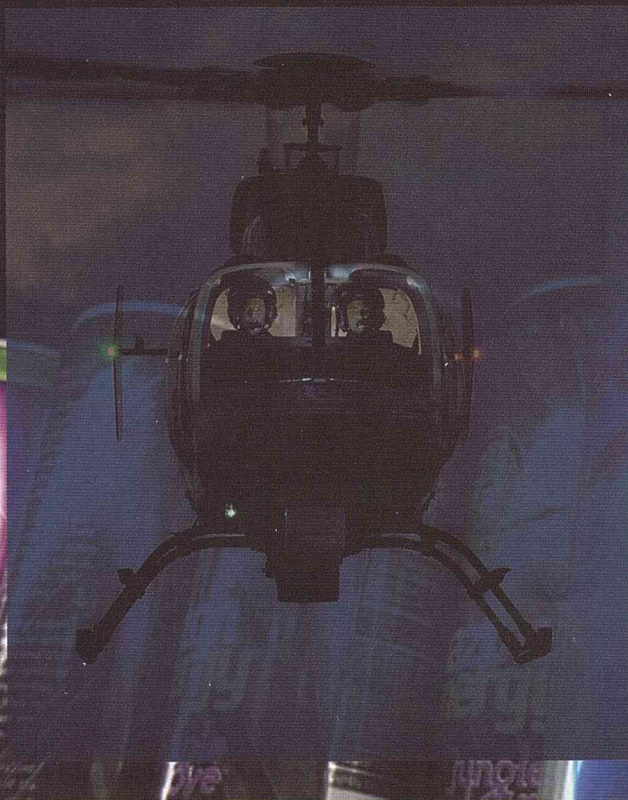


# ENERGY DRINKS:

## Help or Hindrance in Aviation?



By Lieutenant Commander Thomas E. Sather, MSC, USN, CASP Deputy Director of Training, Naval Aerospace Medical Institute

**E**nergy drinks are one of the fastest growing sectors of the beverage industry. There are almost 700 products on the market whose purpose is to enhance an individual's energy level through a mixture of caffeine, taurine, sugar, large doses of vitamins and assorted herbs and extracts. However, unlike soda or fruit juices, these products are not regulated by the Food and Drug Administration (FDA). Instead, this product line is classified as a "nutritional supplement."

The long-term effects of energy drinks on people are not known. What is known is that these products should not be used by any athlete who is participating in activities that increase heart rate and blood pressure.

The use of energy drinks may lead to overstimulation of the heart and reveal previously undiagnosed cardiovascular issues or cause an athlete's untimely demise. As such,

**"Despite claims that energy drinks 'give you wings,' they may in fact interfere with the process of coordination and staying in control of an aircraft during high stress situations."**

the U.S. Navy and Marine Corps prohibits pilots and aircrew from consuming these beverages and even grounds members who have consumed these products for 24 hours after ingestion for safety reasons. In the aviation environment, where people have to make life and death decisions, the Department of the Navy and the Bureau of Medicine and Surgery does not want to risk its human or mechanical assets.

Research on energy drinks in aviation has been limited, but an Oklahoma State University study looked at the effects of energy drinks on pilot skills and found an alarming result. In the study, student pilots drank one of the more popular energy drinks and then were asked to fly a commercial grade flight simulator and perform emergency procedures. The researchers found those who consumed energy drinks had a harder time maintaining straight and level flight. Addition-





out drinks) have been associated with hepatitis, liver failure, heart attacks and strokes. FDA has pulled products that contain popular energy enhancers such as dimethylamylamine and phenylethylamine from shelves of stores like GNC for being dangerous.

For the athlete, putting a stimulant into the body that is specifically designed to increase cardiac output during a time when you're increasing cardiac output simply by participating may be dangerous. The interaction may require hospitalization, as the athlete can exhibit cardiac anomalies (arrhythmias) that will mimic the symptoms of tachycardia. Additionally, we know that large amounts of sugar like those found in energy drinks have been known to impair absorption of fluids, causing diarrhea and other gastrointestinal distress.

## Missing the Mark

Some energy drinks make the claim that they increase performance, concentration, reaction speed, vigilance, emotional status and metabolism. Drug and nutrition companies are constantly in an arms race against each other to create, design or modify the next generation of products, with the prize being billions of dollars in sales. As such, these companies are consistently experimenting with compounds from various sources, such as failed drug trials, natural herbs and other assorted ingredients, in order to discover the next popular supplement. They will often use exotic ingredients and justify their inclusion in a product by citing findings from small research studies using questionable test subjects. However, many of these claims are unfounded and lack scientific proof. In today's society, people assume natural products are safe and do not have side effects. However, this is far from the truth.

Many of the ingredients in energy drinks appear to be added for marketing purposes. Most are included at levels far below an optimal or even therapeutic dose required to elicit an effect. The body treats some of the ingredients, such as sugar, like food. Others,

like most of the vitamins, are excreted from the body in the urine. This is not true of all ingredients. "Natural" products can be as toxic as synthetic ones. In fact, many of the common medicines we take for granted today are derived from natural sources. It is essential to understand that any product that has benefits may also have side effects if taken in inappropriate quantities.

Caffeine presents the biggest danger in energy drinks. Caffeine poisoning and reports of caffeine intoxication are not uncommon in the U.S. It has been reported that caffeine-poisoning cases have increased significantly over the last few years, from 1,128 in 2005 to 13,114 in 2009. A Department of Health and Human Services report stated 20,783 patients visited the emergency room because of energy drink consumption in 2011, an increase of 37 percent from the year before. All this corresponds with the increasing popularity of energy drinks.

Caffeine toxicity can mimic amphetamine poisoning and lead to seizures, psychosis, cardiac arrhythmias and potentially death. As the energy drink industry is highly unregulated, it is up to the consumer to use good judgment.

## Sleep Is the Answer

Aside from the performance enhancing capabilities energy drinks promise, a more serious issue underlies the increased use of energy supplements. More and more people are functioning at a sleep deficit state. Sleep experts agree adults need seven to nine hours a day, but roughly one-third of all Americans gets less than that.

Sleep deprivation has been known to be associated with a host of adverse physical conditions, such as cardiovascular disease, diabetes and even mood disorders. From a metabolic perspective, sleep deprivation has negative effects on body composition. When you sleep less, genetic factors associated with obesity are activated. To illustrate, a hormone called leptin, a starvation hormone that tells your body that you're full when you've eaten, drops when you're sleep-


deprived. This means an individual will feel hungry faster and crave high-fat, high-carbohydrate (high energy) foods even though they have taken in enough calories. The combination of the effects of fluctuating sugar levels and decreased leptin levels trigger an insidious cycle where energy drinks often are used as a temporary crutch to make it through low periods.

Chronic users of energy drinks seem to be taking them for less psychoactive reasons than recreational users or youth. These users do so out of habit, addiction or to compensate for fatigue. Nearly half of all Americans have difficulty sleeping; they blame it on their children, stress or the lure of the internet. A recent study by the U.S. Center for Disease Control and Prevention found that 40.6 million people (30 percent of Americans) are sleeping less than six hours a night. As a result, many need a little pick-me-up to get through the day.

## On the Horizon

While the specific chronic effect of energy drinks is unknown, they have been shown to have restorative properties in the short term from the combination of caffeine and sugar. Normally, the consumption of a single energy drink will not lead to caffeine overdose. However, some larger drinks may contain two or more servings per can, and the consumption of two or more energy drinks in a single day has resulted in caffeine overdoses, a high likelihood of experiencing an energy "crash-and-burn" effect and even dehydration. For pilots, if the body is dehydrated by as little as 1 percent, the corresponding performance degradation is 10 percent.

If you are looking for a single method to boost your energy level, improve memory, increase concentration, strengthen the immune system and decrease your risk of a fatal accident, sleep is the answer. Researchers have discovered an extra 60-90 minutes of sleep each night can have all these effects. Many people argue they operate fine on little sleep; however, studies have shown only a tiny fraction of people are functional on less than eight hours of sleep, and only one person in 1,000 can function effectively on six or fewer hours of sleep. To make matters worse, most people who are sleep deprived do not realize it and use supplements like energy drinks to make it through the day.

The bottom line is not enough is known about the effects of chronic energy drink use. Consumers should therefore be informed of the potential harm these products can cause. 



ally, students under the influence of these drinks were 10 seconds slower to return their aircraft to proper position (heading, attitude, altitude and airspeed) after executing a series of complex turns. Pilots who consumed the drinks were also five seconds slower to complete an emergency checklist than those who did not consume an energy drink.

The impact of these findings is startling. Despite claims that energy drinks "give you wings," they may in fact interfere with the process of coordination and staying in control of an aircraft during high stress situations.

## Exploring the Market

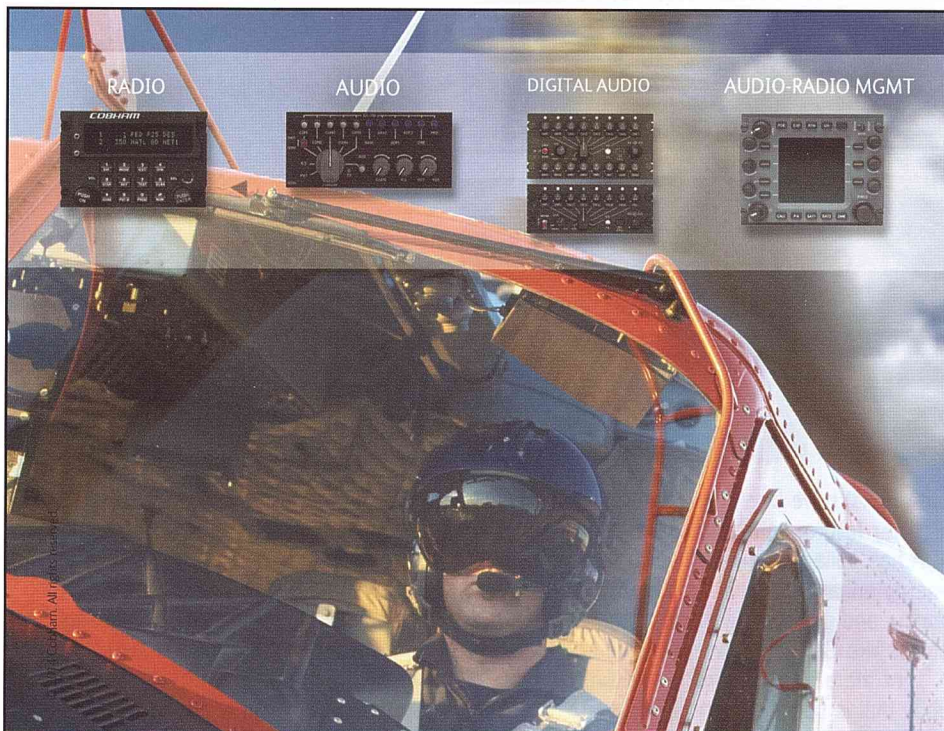
Energy drinks, including small "shot" products like 5 Hour Energy, are readily available in grocery stores, convenience stores and a variety of other places. They are advertised to enhance energy, increase focus and improve athletic performance with catchy slogans such as: "Bigger. Better. Faster. Stronger..." scientifically formulated to provide an incredible energy boost for those who lead active and exhausting lifestyles—from athletes to rock stars."

With more than 600 distinct energy beverage brands on the U.S market, you would expect to find a wide variety of ingredients in them. However, most are slightly different concoctions of the same stock ingredients. The problem exists in the combinations of the ingredients, concentration and speed of ingestion.

Emergency room physicians have described cases of seizures, delusions, heart problems, and kidney or liver damage in people who had downed one or more energy drinks. There have also been documented cases of caffeine-associated deaths and seizures due to the consumption of energy drinks. According to the Poison Control Center, in a five month period from October 2010 to February 2011, there were more than 1,000 energy drink overdoses.

As advertised, energy drinks will give you a boost of energy. They are formulated to deliver high concentrations of caffeine and other stimulants to give the drinker a rush. The drinks contain huge quantities of sugar, caffeine, the amino acid taurine and B vitamins. Some of these ingredients, at least those monitored and regulated by FDA, can be in quantities at 8,000 percent more than the recommended daily allowance. The drinks may also contain a huge variety of natural, exotic or scientific sounding ingredients such as guarana, green tea extract, yerba mate, yohimbine, bitter orange, ginseng, vinpocetine and methylphenylethylamine.

In athletics, the use of energy products may be dangerous. Some ingredients used in weight-loss, bodybuilding and performance-enhancement products (i.e. pre-work-



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