

The Effects of Energy Drinks in the Fire Service.

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Let us review the essential duties of a firefighter and what is expected of each firefighter as we are “called to duty”. That alarm goes off, and we step on the truck; we are in route to the scene. This “call to duty” is the beginning of physiological changes and challenges firefighters experience. These changes involve sympathetic arousal, heavy strenuous work in an adverse environmental condition with unknown exposures that can lead to hyperthermia and dehydration, as well as exposures which lead to the loss of our electrolytes. What follows is disorientation, fatigue, weakness, dizziness, nausea, confusion, and lethargy. An adrenaline rush pursues with anxiety and eventually a cardiovascular strain. This compilation of physiological changes is more likely to occur in firefighters who possess an excess of traditional risk factors for cardiovascular disease along with underlying atherosclerosis and/or structural heart disease. Then the psychological stress kicks in when we go into the fire not knowing what to expect every step we take into the exposure. The possibilities of what we may come across; the trapped victims, the deaths of family members, the children, and fallen firefighters.

When we add energy drinks on board we have increased our risk of a cardiovascular event to happen even sooner. Over 38 countries around the world have either banned these drinks due to the detrimental side effects or placed age limitations on them according to Quartz Media. Studies world-wide have proven the dangers of regular intake of these drinks. The resulting effects on the entire body and our cardiovascular system as indicated below;

To describe the dangers of these drinks, **SAMHSA** (Substance Abuse and Mental Health Services Administration) has compared energy drinks equal to Amphetamines in their actions and side effects.

Energy Drinks Side Effects.		Amphetamines Side Effects.	
Insomnia	Increased heart rate	Insomnia	Abdominal pain
Anxiety	CVA	Anxiety	Nervousness
Agitation	Mood Swings	Agitation	Nausea
Dehydration	Seizures	Dehydration	Dizziness
Aggression		Cardiovascular events	Diarrhea
(after one 12-oz can) - Blood thickening		Emotional Disturbances	Hypertension
	Stiffening in the vessels		
	Hypertension		

The drinks available are; Rock Star, Red Bull, 5hr Energy Drink, Monster, AMP, Cold Brew, NOS Energy, Cellucor, Celsius, ANSI Extreme, Spark and many more.

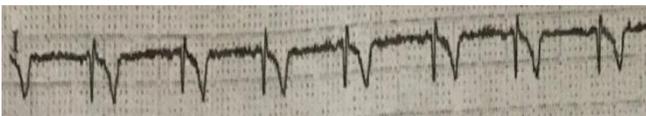
Ingredients vary from one drink to the next.

1. **Taurine** - an amino acid that is also found in some foods. Long term use can cause decrease of energy, anxiety, and you will build a dependence to it according to the CDC.
2. **Guarana** - a Brazilian seed that is an effective stimulant. It contains twice the concentration of caffeine found in coffee seeds.
3. **Ginseng** - a root used for energy in the eastern cultures. The possible side effects may include: menstrual irregularities, painful breasts, itchy skin, rashes, poor appetite, diarrhea, headaches, jitteriness, insomnia, hypoglycemia, moodiness and/or blood pressure changes. Of those listed above, the most common side effect is insomnia.
4. **Synthetic Caffeine** - made in a laboratory. Synthetic caffeine is known to be absorb faster which gives a more sudden crash after its intake. Since it is a synthetic and not natural ingredient, it is not regulated by CDC or FDA. Therefore, the amounts of caffeine content are not seen with the ingredients on energy drinks.

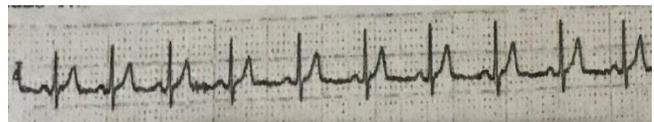
What Energy Drinks do to the Body

- **Brain** – Energy drinks work quickly to block adenosine which is a chemical your brain produces to help you sleep. The caffeine will immediately cause your brain to fire neurons to stimulate an instant energy boost, the same energy boosts you get when your body senses a physical threat.
- **Blood** – With your body in alert mode, the pituitary gland causes adrenaline levels to rise, again providing more energy in the form of glucose to be released into the blood stream.
- **Heart** – The adrenaline released now has an effect on the heart causing it to beat faster to drive more blood and consequently oxygen around the body to your muscles.
- **Back to your Brain** – With the glucose injection into your bloodstream, your body is now full of energy and ready to react to any threats. Dopamine levels increase which gives your brain the sensation of being incredibly energetic.
- **Skin** – Conversely because of the increased heart rate and chemical reactions going on in your body, you will start to sweat more profusely which is dangerous as you risk losing bodily fluids and electrolytes.
- **Body** – After effects or overconsumption of caffeine can start to turn that positive energy boost into anxiety and the “Jitters”. This is caused by dehydration’s effect on your body which ultimately is the biggest thing any athlete tries to avoid.
- **Finally, Back to the Heart.** - At this point the EKG strips as seen below are reflective of energy drinks on board. The rhythms are severely abnormal. The T waves are inverted. The refractory phase is non-existent between the complexes. This scenario causes the atrium to fail in its response to a contraction causing the ventricles to contract stronger in order to push blood to the vital organs which then reflects in an elevated diastolic blood pressure. When we add the situation of a front-line firefighter in an active fire scene with a heart condition, these men and women put their lives as well as their entire crew and the public in danger. We are seeing Atrial Fib, Atrial Flutter, Flat line in lead II, and PAC’s as illustrated in the recent EKG’s performed.

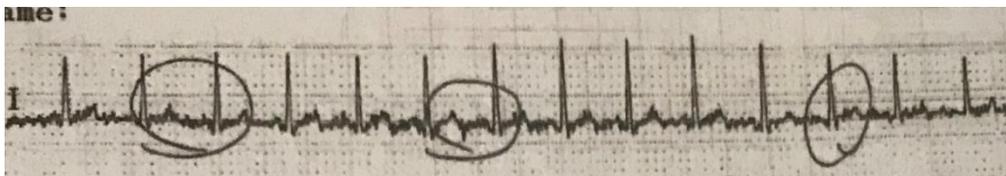
Listed below are several examples of EKG’s that were taken from firefighters heavily into energy drinks. These drinks are known to cause serious cardiovascular events and in many cases death to the firefighter. Several deaths have already been recorded throughout the fire service



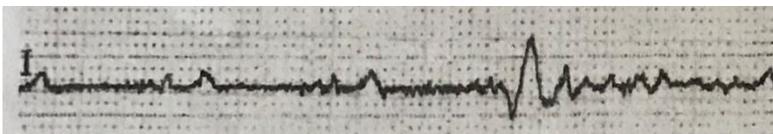
36-year-old consumes 5-15 energy drinks a week. Inverted T waves; no refractory phase



41-year-old consumes 4-10 energy drinks a week. PACs, A-Fib, no refractory phase between



24-year-old consumes 5-15 energy drinks a week. Previous history of CVD. Rhythm of PACs with episodes of A-Fib.



38-year-old with two energy drinks taken two hours prior to EKG. Rhythm of PACs with episodes of A-Fib. No cardiac history

RECOMMENDATIONS:

At this point we need to take a stand against the use of these drinks while on duty. The cases presented in this paper are real and the consequences of continued use place all firefighters at risk as indicated in the studies provided.

STUDIES;

[INDY/LIFE](#)

Australian researchers have found that the sugar-free version of Red Bull may increase the danger of blood clots, and creates "sticky" blood, raising the risk of heart attack or stroke. How this affects the sales of Red Bull – last year 3.5 billion cans were sold in 143 countries – is yet to be seen.

* In 1982 the jet-lagged marketing director of an Austrian toothpaste company tasted Krating Daeng, a Thai energy drink. He saw the potential for a product to fight mental and physical exhaustion. With a few tweaks to the recipe, Red Bull was launched in Austria in 1987.

* It's named after taurine, the organic acid it contains that was first isolated in a bull.

* In early marketing tests half the tasters declared it disgusting. For years Austrian bars did not sell it, regarding it as medicinal.

* It was launched in the US and Europe in 1997; but it is still prohibited as a soft drink in Norway, Uruguay, Denmark and Iceland.

* The formula contains the same amount of caffeine as a cup of filter coffee, around 80mg. It's meant to taste of mixed berries, but some liken it to sweet cough mixture.

Drinking 32 ounces of energy drink is associated with potentially harmful changes in blood pressure and heart function that are beyond those seen with caffeine alone, according to a new study.

There are more than 500 energy drink products on the market, and their increased popularity is matched by a significant rise in energy drink-associated emergency department visits and deaths.

[American Heart Association](#)

Manufacturers and fans of these products claim they are as safe as caffeine, but there is little evidence to support that claim.

Caffeine in doses up to 400 mg (about five cups of coffee) is generally recognized as safe by the Food and Drug Administration. While energy drinks usually contain caffeine, little is known about the safety of some of their other ingredients the study team writes in the [Journal of the American Heart Association](#).

Related: [Middlebury College Bans Energy Drinks](#)

To see what effects these other components have, researchers compared physical changes in a group of 18 healthy men and women after consuming a commercially available energy drink and after drinking another concoction with the same amount of caffeine but none of the other ingredients.

Besides 320 mg of caffeine - the amount in about four cups of coffee - the energy drink contained 4 ounces of sugar, several B vitamins and a proprietary "energy blend" of taurine and other ingredients that are often found in drinks like Monster Energy, Red Bull and 5-Hour Energy.

Sachin A. Shah of David Grant Medical Center on Travis Air Force Base and University of the Pacific in Stockton, California, and colleagues measured the participants' blood pressure and used an electrocardiogram (often called an ECG or EKG) to measure heart electrical activity for 24 hours after the subjects consumed the drinks.

Related: [FDA Checks Into Deaths Linked to Energy Drink](#)

An ECG change known as QTc prolongation and sometimes associated with life-threatening irregularities in the heartbeat was seen after drinking the energy drink, but not after drinking the caffeine beverage, the study team reports.

Several drugs have been withdrawn from the market just for causing ECG changes of a similar magnitude, the authors note.

Blood pressure increased by close to 5 points after drinking the energy drink, but by just under 1 point after drinking the caffeine beverage. Blood pressure also remained elevated six hours later.

These changes are by no means worrisome for healthy individuals, the researchers say, but patients with certain heart conditions might need to exercise caution consuming energy drinks.

Related: [Can Caffeine Kill You?](#)

"The energy drink industry claims that their products are safe because they have no more caffeine than a premium coffee house coffee," said Dr. Jennifer L. Harris from University of Connecticut's Rudd Center for Food Policy and Obesity in Storrs, who wasn't involved in the study.

"However, energy drinks also contain a proprietary 'energy blend,' which typically consists of stimulants and other synthetic and herbal additives. Some of these ingredients (including taurine and guarana) have not been FDA-approved as safe in the food supply, and few studies have tested the effects of caffeine consumption together with these 'novelty' ingredients," she said by email.

"On top of that, energy drinks are highly marketed to adolescent boys in ways that encourage risky behavior, including rapid and excessive consumption," she said. "As a result, emergency room visits by young people in connection with energy drinks are rising."

Any research that compares the effects of consuming energy drinks versus caffeine alone provides important evidence for public health advocates who have urged the energy drink companies to stop targeting youth with these potentially harmful products, Harris added.

Related: [Energy Drinks Can Be Harmful to Young Children](#)

More than 5,000 cases of people who got sick from energy drinks were reported to U.S. poison control centers between 2010 and 2013, and almost half of those cases were in children who did not realize what they were drinking.

Energy drinks typically contain high levels of sugar and at least as much caffeine as a [cup of coffee](#). But the drinks also often tout the energy-boosting effects of a mix of other ingredients, ranging from taurine and l-

carnitine, naturally occurring amino acids, to ginseng (a Chinese herb typically used in alternative medicine). But despite this "special blend" of ingredients, studies suggest [energy drinks don't boost attention](#) any better than a cup of coffee does.

Even just one 16-ounce energy drink can increase blood pressure and stress hormones and could put a healthy young adult at risk for heart damage, concludes a [2015 Mayo Clinic study](#).

The [American Academy of Pediatrics](#) says energy drinks have "no place" in the diet of children and adolescents.

[Quartz Media](#) lists countries which have banned energy drinks and others which have limited it sales and [JAMA](#) 10/2016.

[Information within this report was obtained from additional studies noted in SAMHSA, NIH, FDA data base.](#)