**SUPPLEMENTARY APPENDIX**

**Analysis of Cases Indicating Fatalities and Consumption of Energy Drinks, U.S. Food and Drug Administration Center for Food Safety and Applied Nutrition (CFSAN) Adverse Event Reporting System (CAERS), 2008 to 2015**

In the 2008 to 2015 CFSAN Adverse Event Reporting System (CAERS) data, 47 cases indicated deaths and intake of energy drinks. This total includes deaths in both single and multiple energy drink product reports. Nine cases were excluded from this analysis because products listed on the reports other than the energy drinks were cited as suspected in the outcomes; one was excluded to protect personally identifiable information not previously made public. For the remaining analytical sample of 37 cases, demographic information (age, sex), energy drink information (product, dose, frequency, and dates of use), other relevant history where available (smoking, alcohol, drugs, and health conditions), and event descriptions were extracted from CAERS. Autopsy and toxicology reports were reviewed, if available. Cases were categorized by energy drink exposure: unknown caffeine dose; low-dose caffeine exposure (≤400 mg/day); high-dose caffeine exposure (>400 mg/day for adults or >2.5 mg/kg/day for adolescents, if weight available); energy drink exposure reported with co-consumption of other substances, and chronic energy drink exposure – unclear dose. SAS version 9.3 (Cary, NC) was used for statistical analysis. The FDA CFSAN medical officer reviewing the cases used the “Caffeine Informer” website ([www.caffeineinformer.com](http://www.caffeineinformer.com))1 to estimate energy drink caffeine content. A second FDA CFSAN medical officer specializing in cardiology reviewed cases with questionable cardiac history.

Of the 37 CFSAN adverse event cases indicating energy drink exposures and fatalities, 26 (70.3%) were male, 10 (27.0%) female, and 1 of unknown sex (2.7%). Among the cases, 10 (27.0%) were adolescents aged 13 to 19 years old, 15 (40.5%) were adults aged 20 to 59 years old, six (16.2%) were adults ≥60 years old, and six (16.2%) did not list age. For the 30 cases with age data, the mean was 35.5 years (range 14 years to 88 years).

The most often cited product [by 24 cases (64.9%), including five adolescents and 19 adults)] was 5-hour ENERGY®, a 2-ounce shot product containing 200 mg of caffeine. The second most commonly indicated product, specified on the reports of four adolescents and five adults, was Monster®, a product containing 80 mg of caffeine per 8 fluid ounces (oz.) sold in 16- and 24-fluid-oz. containers). Data from other reports indicated that one adolescent consumed the NoDoz Energy® shot product (115 mg caffeine/1.89 fluid oz.), while one adult each drank the Kirkland Energy Shot® (180 mg/2 fluid oz.), Redline/Xtreme® (product form not specified on report: drink, 316 mg/8 fluid oz.; shot, 300 mg/3 fluid oz.), or Liftoff® (72 mg/8 fluid oz., tablet mixed with water as directed on label), and three adults ingested the 5-hour ENERGY® shot product with another energy drink: Great Value Energy® (one), N.O.-Xplode® (one), and Monster® (one).

Of the 37 cases, 10 (27.0%) involved females. Consumption of 5-hour ENERGY® shots was noted for three females of unknown age and unknown cause of death. One 23-year old female possibly drank 5-hour ENERGY® before she died of a motor vehicle accident (MVA), and a 65-year-old female reportedly had a myocardial infarction (MI) after drinking one 5-hour ENERGY® shot. Two females reportedly drank Monster®: a 14-year-old female with mitral valve prolapse and Ehlers-Danlos syndrome, type IV (EDS) drank two 24-oz. cans of Monster® and died of cardiac arrhythmia, and a 21-year-old female with focal segmental glomerulosclerosis (FSG) died after one can of Monster®. A 14-year-old female who reportedly consumed an unknown amount of the NoDoz® shot product died of an MI. A 50-year-old healthy female who reportedly drank a Kirkland Energy Shot® daily died of cardiac arrest.

Most cases [26 (70.3%)] were male. Four males of unknown ages reportedly consumed 5-hour ENERGY® (two causes of death not available, one MI, and one suicide were noted). Of the six adolescent males, one 17-year-old and two 18-year-olds drank 5-hour ENERGY® (one MI, one acute alcohol intoxication, and one aspiration). Three 19-year-old males ingested Monster® energy drinks: one had cardiac arrhythmia, another had cardiac arrest, and the cause of death could not be determined for the third. Among those aged 20 years to 55 years, seven consumed 5-hour ENERGY®, and four drank Monster®. Of the five males aged 60 years to 88 years, a 60-year-old ingested Liftoff®, and four drank 5-hour ENERGY® (aged 62, 63, 63, and 88 years).

Among adolescents, causes of death included cardiac arrhythmia for two cases with cardiac pathology: one autopsy implicated caffeine toxicity in the setting of EDS and mitral valve prolapse (although caffeine levels were not determined), and the other autopsy implicated ischemic cardiomyopathy. The coroner reported cardiac arrest following sexual activity, cardiomegaly, and cardiomyopathy in another case. Two adolescents had MIs. One adolescent died of aspiration, one had acute alcohol poisoning, and two reports did not indicate the cause of death. In another case, the cause of death was unable to be ascertained for a 19-year-old male despite autopsy and toxicology tests.

Fourteen adults had fatal cardiac events or conditions (MI – seven, cardiac arrest or cardiopulmonary arrest – four, cardiac arrhythmia – one, cardiomegaly – one, MI and heart failure due to morbid obesity – one). One case was ruled an accident due to toxicity from the stimulant 1,3-dimethylamylamine, but the autopsy report also described hypertension and cardiomegaly. The reports for six cases did not specify cause of death. Two adults died of motor vehicle accidents (MVAs), two committed suicide, and one died of respiratory failure and pneumonia. Autopsy was unable to determine the cause of death for a case with alprazolam (Xanax®) detected in the individual’s system.

Seven cases were males whose deaths were related to alcohol consumption or use of illicit drugs, substance abuse, and/or stimulants. One 18-year-old had a pill addiction and aspirated with cough medicine in his system. Another 18-year-old drank hard liquor with several energy drinks and died of acute alcohol intoxication. A 55-year-old healthy male died after consuming two beers and one energy drink. A 60-year old healthy male who died from an MI was taking multiple dietary supplements, including an herbal tea with caffeine, to maintain health and weight. A 20-year-old reportedly consumed an energy drink with alprazolam (Xanax®), and a 35-year-old male with cardiomegaly and attention deficit disorder (ADD) treated with the stimulant amphetamine and dextroamphetamine (Adderall®) drank 5-hour ENERGY®. A 23-year-old who died from toxic effects of the stimulant 1,3-dimethylamylamine took multiple bodybuilding dietary supplements and 5-hour ENERGY®.

Fatalities were divided into the following categories, presented in Tables 1-5 at the end of this Supplementary Appendix:

* Insufficient information on cause of death and energy drink exposure
* Energy drink exposure that stopped before event of death
* Energy drink exposure with other substances involved
* Low-dose caffeine exposure (≤400 mg/day)
* High-dose caffeine exposure (>400 mg/day for adults or >2.5 mg/kg/day for adolescents, if weight available)
* Chronic energy drink exposure – unknown daily dose

Eleven cases had insufficient information on cause of death or energy drink exposure (dose, frequency, temporal relation to death):

* + Cause of death not available and unknown energy drink exposure (dose, frequency, and temporal relation to event of death): seven
	+ A 14-year-old female – unknown if energy drink consumed prior to MI
	+ A 23-year-old female – unknown if energy drink consumed prior to MVA
	+ A 19-year-old male – unknown if energy drink consumed prior to fatal arrhythmia
	+ A 33-year-old male – unknown if energy drink consumed prior to MI

 Two had energy drink exposures that stopped before event of death:

* + A 27-year old male collapsed at least a month after his last energy drink exposure; died from acute respiratory failure the following year.
	+ A 63-year old male stopped energy drink consumption after episode of caffeine-induced psychosis; the following year, he committed suicide, method not disclosed.

Seven males had energy drink exposure with other substances involved:

* + Xanax® and undetermined cause of death.
	+ Hard liquor and acute alcohol poisoning.
	+ Beer and MI.
	+ Cold medicine and aspiration.
	+ Bodybuilding dietary supplements and stimulant toxicity.
	+ Multiple dietary supplements, including an herbal tea with caffeine, and MI.
	+ ADD stimulant amphetamine and dextroamphetamine and cardiomegaly.

Six cases with low-dose (≤400 mg) caffeine exposures from energy drinks:

* + A 31-year-old male drank one energy shot(200 mg caffeine) before falling asleep and dying from an MVA.
	+ A 42-year-old male had cardiopulmonary arrest after drinking one can of an energy drink (240 mg caffeine).
	+ One 63-year old healthy male who had one energy drink daily died of an MI (200 mg caffeine).
	+ An 88-year-old male with a prior MI died of cardiopulmonary arrest after ingesting half of an energy drink shot (100 mg caffeine).
	+ A 65-year old female suffered an MI after one energy drink shot or beverage (200 mg caffeine).
	+ A 21-year-old female with FSG was found dead from cardiac arrhythmia after drinking one energy drink (160 mg caffeine) the previous night.

Seven cases reportedly had high-dose caffeine exposure (>400 mg/day for adults or >2.5 mg/kg/day for adolescents, if weight available) from energy drinks;

* + An 18-year-old, unknown sex, with an unspecified heart defect died after consuming 20 5-hour ENERGY® shots over seven days (4000 mg caffeine total or 571 mg/day).
	+ A male, unknown age, with “a lot of emotional problems;” habitually drank four to five shots of 5-hour ENERGY® (800 – 1000 mg caffeine) per day for approximately a year; committed suicide, method not disclosed.
	+ A 17-year-old male reportedly drank five 5-hour ENERGY® shots (1000 mg caffeine) before playing football and dying from an MI.
	+ A 19-year-old male who had two to four cans daily of Monster® (320 mg – 640 mg caffeine) over three years died due to sudden cardiac arrest after sexual intercourse. The upper limit of caffeine for his weight and age was 142 mg/day.
	+ A 19-year-old healthy male reportedly had three to four cans of Monster® (480 – 640 mg caffeine) the day before death of undetermined causes. The upper limit of caffeine for his weight and age was 221 mg/day.
	+ A 31-year-old male habitually drank 5-hour ENERGY® shots (800 mg caffeine) prior to a fatal MI.
	+ A 14-year-old female with EDS and mitral valve prolapse reportedly died of arrhythmia after drinking two large (24-oz.) cans of Monster® (240 mg caffeine each). The upper limit of caffeine for her weight and age was 143 mg/day.

Four chronic energy drinkers, unknown number of energy drinks per day:

* + A 62-year-old male died of MI and heart failure due to morbid obesity. Multiple empty energy drink containers were found in his garbage.
	+ A 31-year-old male, a chronic energy drink user with no significant medical history, died of cardiac arrest after playing basketball.
	+ A male (of unknown age) who drank 5-hour ENERGY® daily died of MI.
	+ A 50-year-old healthy female who consumed an unknown number of energy drinks daily died of cardiac arrest while walking.

Of the seven cases who had autopsies, information from six was available in the CAERS database:

* + A 21-year-old female with FSG reportedly consumed one Monster® drink (160 mg caffeine): the autopsy attributed her death to a cardiac arrhythmia due to a dilated left ventricle with FSG contributing to her demise; manner of death: natural. It was unclear if she knew of her FSG or if she was treated for FSG. The caffeine level was the only positive in the toxicology report. A separate report from cardiac pathologists examining the harvested heart indicated right (not left) ventricular dilatation and no findings of significant coronary artery disease, acute ischemic changes, acute intraluminal coronary thrombus, or significant changes in the myocardium.
	+ A 14-year-old female with mitral valve prolapse and EDS: the autopsy blamed her death on cardiac arrhythmia due to caffeine toxicity after exposure to two Monster® drinks (240 mg caffeine each). Toxicology tests were negative, and her caffeine levels were not measured.
	+ An 18-year-old male who abused pills and drank more than one bottle of 5-hour ENERGY® for one-and-a-half to two years died of aspiration. Prior to death, he requested over-the-counter medications, including acetaminophen/diphenhydramine, to sleep better. Reportedly he had a negative toxicology screen, but “a lot of cold medicine” was found in his system (autopsy not available to CAERS).
	+ A 23-year-old male died of accidental ingestion from toxic effects of 1,3-dimethylamylamine with hepatic steatosis, cardiomegaly, and hypertension. The toxicology report was not disclosed, except for a positive result for 1,3-dimethylamylamine.
	+ A 20-year-old male, who was seen drinking energy drinks and taking alprazolam: the autopsy was unable to determine the cause of death, but toxicology tests indicated alprazolam was found in his system.
	+ Two 19-year-old old males with alleged exposures to Monster® energy drinks had autopsies:
		- One 19-year-old male with cardiac arrhythmia due to ischemic cardiomyopathy; his mother was unsure if or how much he drank of a Monster® energy drink prior to death, but she indicated that he drank caffeinated beverages (coffee and soft drinks) daily. Toxicology results were not available.
		- One 19-year-old male whose autopsy did not determine cause of death: reportedly he drank three to four cans of Monster® (160 mg each) prior to death. Initial toxicology tests were negative. Postmortem blood caffeine level was 1.2 mg/L.

Two cases referred to findings from coroner investigations: the official reports were not available in the CAERS database:

* + An 18-year old male who died after consuming hard liquor and several energy drinks: reportedly, the coroner indicated that the cause of death was respiratory failure due to acute alcohol poisoning (blood alcohol level 0.4%, four times the legal limit). Caffeine tests were requested but not available in CAERS.
	+ A 19-year-old male who habitually drank two to four energy drinks per day: the reported findings of the coroner identified arrhythmia, cardiomegaly, and cardiomyopathy; cardiac arrest following sexual intercourse as the cause of death; and negative toxicology tests, excepting a caffeine level of 2.4 mg/L.

**Discussion**

Except for the six cases with available autopsies, there was insufficient medical information and evidence beyond the adverse event reports to link energy drink consumption to deaths. Relatives and friends/acquaintances submitted most adverse event reports attributing energy drinks to deaths but provided scant information of energy drink consumption and circumstances surrounding the deaths.

An approach to link energy drink consumption to the reported deaths is to estimate the dose of caffeine from energy drinks consumed prior to the event of death and then to determine the safety of the dose. The caffeine content of the six energy drinks implicated in these adverse event reports was 72 mg to 316 mg per container. The caffeine dose could not be estimated for 20 adverse event reports that did not indicate how many energy drinks were consumed. For the remaining 17, the estimated caffeine doses from energy drinks consumed prior to the event of death was 0 mg to 1000 mg*.*

For adults, caffeine doses ≤400 mg/day typically do not cause symptoms seen in acute caffeine toxicity and are considered safe.2 The recommended upper limits of dietary caffeine are <100 mg/day for children and <2.5 mg/kg/day for adolescents.3 For adults, symptoms of acute caffeine intoxication typically occur after ingestion of 500 mg or 10 mg to 15 mg caffeine/kg: individuals may experience restlessness, insomnia, muscle twitching, tachycardia, palpitations, diuresis, and gastrointestinal distress. Symptoms of severe caffeine toxicity (>15 mg/kg) include seizures, shortness of breath, psychosis, arrhythmias, cardiovascular collapse, hematemesis, and rhabdomyolysis.2 Lethal caffeine doses for adults are typically ≥10 g or ≥80 – 100 mg/kg.4 A 2017 systematic review of studies examining the adverse effects of caffeine consumption concluded that caffeine doses ≤400 mg/day are safe for healthy adults and that the upper limit of 2.5 mg caffeine/kg/day remains appropriate for adolescents.5

Among adult cases, two had energy drink caffeine doses >400 mg: a 31-year old male who had an MI (estimated caffeine dose 800 mg) and a male, unknown age, who committed suicide, method not disclosed (800 mg to 1000 mg). Individuals have committed suicide by caffeine poisoning, but typically have taken lethal doses from oral caffeine pills or powder.6 The caffeine doses of this suicide case were not lethal caffeine doses.

The caffeine doses from energy drinks could be calculated for six adolescents. All six doses were not safe, even for adults (480 mg to 1000 mg), and symptoms of acute caffeine toxicity could have manifested at these doses. High-risk behavior may have been involved in three cases: a 17-year old male who died of an MI after drinking multiple energy drinks (1000 mg caffeine) to get “jacked up” before a football game, the 18-year old with unspecified heart defect, sex unknown, who had 20 energy drinks in seven days (4000 mg caffeine or 571 mg/day), and an 18-year old male who died of acute alcohol intoxication (≥600 mg caffeine). The upper limit of caffeine for adolescents is 2.5 mg/kg/day, and the doses of three adolescents exceeded their upper limits. An adolescent would have to weigh at least 80 kg (176.4 pounds) to drink an energy shot with 200 mg caffeine or 64 kg (141.1 pounds) to consume an energy drink with 160 mg caffeine.

Autopsies were problematic in linking energy drinks to energy drink consumption. Three reports indicated postmortem blood caffeine tests. A 19-year old male with autopsy findings of arrhythmia, cardiomyopathy, and cardiomegaly had a measurement of 2.4 mg/L, and another 19-year old male whose death could not be determined had a measurement of 1.2 mg/L. These measurements were far below those associated with acute caffeine toxicity symptoms (>30 mg/L) or with caffeine-related fatalities (>80 mg/L). Toxicology results of a 21-year old female with FSG who had one energy drink (160 mg caffeine) the night before she died had one positive result for caffeine, but levels were not determined. The medical examiner did not examine the heart but reported that the cause of death was cardiac arrhythmia due to a dilated left ventricle with FSG. Cardiac pathologists examined the heart and reported a dilated right (not left) ventricle and no other overt abnormal findings. Neither report from the cardiac pathologists or the medical examiner discussed the possible role of caffeine in this death.

 Caffeine toxicity was implicated in one autopsy. An autopsy of a 14-year-old who collapsed after reportedly consuming two Monster® drinks (480 mg caffeine) attributed the cause of death to cardiac arrhythmia due to caffeine toxicity complicating mitral valve regurgitation in the setting of EDS. Autopsy findings also described mitral valve prolapse, cardiomegaly with subendocardial and perivascular fibrosis, and patchy replacement fibrosis and multifocal contraction band necrosis with interstitial acute inflammation. Caffeine levels were not measured, but her caffeine intake from energy drinks far exceeded the safe limit for her weight (143 mg/day).

Nineteen cases had cardiac deaths. Among the adults who had cardiac deaths, four had significant health or cardiac issues, including the 88-year-old male with a previous MI, a 62-year old male who had an MI due to heart failure and obesity (chronic consumption of energy drinks), a 35-year-old male with ADD who died of cardiomegaly (chronic consumption of energy drinks), and the 21-year-old female with FSG. The estimated energy drink caffeine doses for six adults with cardiac deaths were <400 mg, including three adults >60 years old whose caffeine doses were ≤200 mg. What constitutes safe caffeine intake for patients with cardiovascular disease or cardiac conditions has been debated.7 Toxic doses of caffeine can alter the electrophysiological and cardiovascular properties of the heart, which can lead to the development of life-threatening arrhythmias. Case reports have described patients with underlying cardiac disease who developed arrhythmias after ingesting high amounts of caffeine. Large epidemiologic studies, however, have not observed an association between increased coffee intake and risk of cardiovascular outcomes, including atherosclerosis, stroke, or coronary heart disease. Studies suggest no association between increased caffeine intake and risk of atrial fibrillation or other arrhythmias in high-risk cardiovascular disease subjects, including those with a history of MI. Clinicians continue to counsel patients with underlying cardiac disease, increased risk of arrhythmias, or sensitivity to caffeine to avoid ingesting beverages with “excessive” amounts of caffeine.7

This approach of estimating the caffeine dose from energy drinks and determining its safety is limited. The adverse event reports also described consumption of coffee, tea, soft drinks with caffeine, and supplements with caffeine. It is likely that cases were exposed to higher caffeine doses prior to death. Little is known about how caffeine interacts with other substances, such as alcohol or stimulants, or with other popular energy drink ingredients (e.g., taurine), but it is thought that the physiologic effects may be additive or synergistic.7 Due to genetic variability, some individuals metabolize caffeine at slower rates and may experience more serious adverse effects from caffeine.7 Although medical evidence is lacking, clinicians have assumed that the elderly, children, or the frail are more sensitive than other populations to the effects of caffeine.4

Limited data from these adverse event reports suggest that prior to their deaths, some cases, especially adolescent cases, have ingested caffeine doses at levels where symptoms of acute caffeine toxicity could have manifested. Information from the adverse event reports of these fatalities, however, was largely insufficient to conclusively link energy drink consumption to fatalities. Basic information about dose, temporal relation to death, causes of death, and medical history of cases was not available in many reports. These adverse event reports also represent a small number of cases, rendering generalizability to other energy drink consumer populations problematic.

**Tables**

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| **Table 1.** **Insufficient Information on Exposure and Cause of Death, CAERS 2008 – 2015**  |
| **Age (y)**  | **Sex** | **Energy Drink** | **Cause of Death** |
| NA | Male | 5-hour ENERGY® | NA |
| NA | Female | 5-hour ENERGY® | NA |
| NA | Female | 5-hour ENERGY® | NA |
| NA | Male | 5-hour ENERGY® | NA |
| NA | Female | 5-hour ENERGY® | NA |
| 40 | Female  | Redline/Xtreme® | NA |
| 45 | Male | 5-hour ENERGY® | NA |
| 14 | Female | NoDoz Energy Shot® | Myocardial infarction |
| 19 | Male | Monster® | Cardiac arrhythmia |
| 23 | Female | 5-hour ENERGY® | Motor vehicle accident |
| 33 | Male | 5-hour ENERGY® | Myocardial infarction |
| Abbreviation: CAERS, Center for Food Safety and Applied Nutrition Adverse Event Reporting System. |

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| **Table 2.** **History of Energy Drink Exposures and Cause of Death, CAERS 2008 – 2015**  |
| **Age (y)** | **Sex** | **Energy Drink** | **Cause of Death** |
| 27 | Male | 5-hour ENERGY® | Acute respiratory failure, pneumonia |
| 63 | Male | 5-hour ENERGY® | Suicide, method not disclosed |
| Abbreviation: CAERS, Center for Food Safety and Applied Nutrition Adverse Event Reporting System. |

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| **Table 3.** **Exposures of Energy Drink and Other Substances, Cause of Death, CAERS 2008 – 2015**  |
| **Age (y)** | **Sex** | **Exposures** | **Cause of Death** |
| 18 | Male | Alcohol and 5-hour ENERGY® | Acute alcohol poisoning; respiratory failure |
| 18 | Male | Cold medicine and 5-hour ENERGY® | Aspiration |
| 20 | Male | Alprazolam and Monster® | Not able to be determined; positive alprazolam test |
| 23 | Male | Bodybuilding dietary supplements and 5-hour ENERGY® | Toxic effects of 1,3-dimethylamylamine |
| 35 | Male | ADD stimulant medication and 5-hour ENERGY® | Cardiomegaly |
| 55 | Male | Alcohol and Monster® | Myocardial Infarction |
| 60 | Male | Multiple dietary supplements and Liftoff® | Myocardial infarction |
| Abbreviations: CAERS, Center for Food Safety and Applied Nutrition Adverse Event Reporting System. ADD, attention deficit disorder. |

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| **Table 4.** **Low-Dose (≤400 mg) Caffeine Exposure, CAERS 2008 – 2015**  |
| **Age (y)** | **Sex** | **Energy Drink** | **Cause of Death** |
| 21 | Female | Monster® | Cardiac arrhythmia |
| 31 | Male | 5-hour ENERGY® | Motor vehicle accident |
| 42 | Male | Monster® | Cardiopulmonary arrest |
| 63 | Male | 5-hour ENERGY® | Myocardial infarction |
| 65 | Female | 5-hour ENERGY® | Myocardial infarction |
| 88 | Male | 5-hour ENERGY® | Cardiopulmonary arrest; cardiovascular disease |
| Abbreviation: CAERS, Center for Food Safety and Applied Nutrition Adverse Event Reporting System.  |

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| **Table 5.** **High-Dose (>400 mg) Caffeine Exposure, CAERS 2008 – 2015**  |
| **Age (y)** | **Sex** | **Energy Drink** | **Cause of Death** |
| 14 | Female | Monster® | Cardiac arrhythmia due to caffeine toxicity |
| 17 | Male | 5-hour ENERGY® | Myocardial infarction |
| 18 | Unknown | 5-hour ENERGY® | NA (probable heart defect) |
| 19 | Male | Monster®  | Cardiac arrest, cardiomyopathy, cardiomegaly |
| 19 | Male | Monster®  | Not able to be determined |
| 31 | Male | 5-hour ENERGY® | Myocardial infarction |
| NA | Male | 5-hour ENERGY® | Suicide, method not disclosed |
| Abbreviation: CAERS, Center for Food Safety and Applied Nutrition Adverse Event Reporting System. |

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| **Table 6.** **Chronic Energy Drinkers, Unknown Dose, CAERS 2008 – 2015**  |
| **Age (y)** | **Sex** | **Energy Drink** | **Cause of Death** |
| NA  | Male | 5-hour ENERGY® | Myocardial infarction |
| 31 | Male | 5-hour ENERGY® | Cardiac arrest |
| 50 | Female | Kirkland Energy Shots® | Cardiac arrest |
| 62 | Male | 5-hour ENERGY® | Myocardial infarction and congestive heart failure due to obesity |
| Abbreviation: CAERS, Center for Food Safety and Applied Nutrition Adverse Event Reporting System. |

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| **Table 7.** **Cases Indicating Fatalities and Consumption of Energy Drinks, CAERS 2008 – 2015** |
| **Age (y)**  | **Sex** | **Energy Drink** | **Cause of Death** |
| * **Insufficient information on exposure and/or cause of death**
 |
|  NA | Male | 5-hour ENERGY® | NA |
| NA | Female | 5-hour ENERGY® | NA |
| NA | Female | 5-hour ENERGY® | NA |
| NA | Male | 5-hour ENERGY® | NA |
| NA | Female | 5-hour ENERGY® | NA |
| 40 | Female | Redline/Xtreme® | NA |
| 45  | Male | 5-hour ENERGY® | NA |
| 14 | Female | NoDoz Energy Shot® | Myocardial infarction |
| 19 | Male | Monster® | Cardiac arrhythmia |
| 23 | Male | 5-hour ENERGY® | Motor vehicle accident |
| 33 | Male | 5-hour ENERGY® | Myocardial infarction |
| * **Energy drink history and causes of death**
 |
| 18 | Male | 5-hour ENERGY® | Respiratory failure; acute alcohol poisoning |
| 63 | Male | 5-hour ENERGY® | Suicide, method not disclosed |
| * **Low-dose (≤400 mg) caffeine exposure**
 |
| 21 | Female | Monster® | Cardiac arrhythmia |
| 31 | Male | 5-hour ENERGY® | Motor vehicle accident |
| 42 | Male | Monster® | Cardiopulmonary arrest |
| 63 | Male | 5-hour ENERGY® | Myocardial infarction |
| 65 | Female | 5-hour ENERGY® | Myocardial infarction |
| 88 | Male | 5-hour ENERGY® | Cardiopulmonary arrest; cardiovascular disease |
| * **High-dose (>400 mg) caffeine exposure**
 |
| 14 | Female | Monster® | Cardiac arrhythmia due to caffeine toxicity |
| 17 | Male | 5-hour ENERGY® | Myocardial infarction |
| 18 | Unknown | 5-hour ENERGY® | NA (unspecified heart defect) |
| 19 | Male | Monster® | Cardiac arrest, arrhythmia, cardiomyopathy, cardiomegaly |
| 19 | Male | Monster®  | Not able to be determined |
| 31 | Male | 5-hour ENERGY® | Myocardial infarction |
| NA | Male | 5-hour ENERGY® | Suicide, method not disclosed |
| * **Chronic energy drinkers, unknown dose**
 |
|  NA  | Male | 5-hour ENERGY® | Myocardial infarction |
| 31 | Male | 5-hour ENERGY® | Cardiac arrest |
| 50 | Female | Kirkland Energy Shots® | Cardiac arrest |
| 62 | Male | 5-hour ENERGY® | Congestive heart failure due to obesity |
|  ***(continued)*** |

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| **Table 7. *(continued)*****Cases Indicating Fatalities and Consumption of Energy Drinks, CAERS 2008 – 2015**  |
| **Age (y)**  | **Sex** | **Energy Drink** | **Cause of Death** |
| * **Exposures of energy drinks and other substances**
 |
| 18 | Male | 5-hour ENERGY® (with alcohol) | Acute alcohol poisoning; respiratory failure |
| 18 | Male | 5-hour ENERGY® (with cold medicine) | Aspiration  |
| 20 | Male | 5-hour ENERGY® (with alprazolam) | Not able to be determined |
| 23 | Male | 5-hour ENERGY® (with bodybuilding supplements) | Toxic effects of 1,3-dimethylamylamine |
| 35 | Male | 5-hour ENERGY® (with levoamphetamine and dextroamphetamine) | Cardiomegaly |
| 55 | Male | Monster® (with alcohol) | Myocardial infarction |
| 60 | Male | Liftoff® (with multiple dietary supplements) | Myocardial infarction |
| Abbreviations: CAERS, Center for Food Safety and Applied Nutrition Adverse Event Reporting System; NA, not available. |

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