Editorials

The Potential Adverse Health Effects of Energy Drinks

JAMES MacDONALD, MD, *Nationwide Children's Hospital, Columbus, Ohio*

Because energy drinks are becoming more popular in the United States, family physicians should be familiar with them and their potentially harmful effects. Energy drinks are distinctly different from soft drinks or sports drinks. Soft drinks (e.g., Coke, Pepsi) contain flavorings, sugars or artificial sweeteners, and often caffeine; sports drinks (e.g., Gatorade) contain sugars and electrolytes. In contrast, energy drinks (e.g. Red Bull) typically contain more caffeine than soft drinks, as well as sugars and dietary supplements. Energy drinks are marketed aggressively with claims that they will boost performance, attention, and mood, or decrease weight and reaction time.[1]

The full list of supplements used in energy drinks is lengthy. Many energy drinks contain herbal products, such as guarana, ginseng, and yohimbine. They may also contain the amino acids taurine and 5-hydroxytryptophan, or large doses of B vitamins.[1] Some contain bitter orange (which contains synephrine) or ephedra, both of which are stimulants with controversial histories.[2]

These additives are regulated under the Dietary Supplement Health and Education Act of 1994.[3] They are treated differently from conventional foods or drugs, even though the chemicals in energy drinks can have pharmacologic properties. Adequate labeling of the individual ingredients is somewhat lax, and consumers may have difficulty discerning exactly what they are drinking.

The first energy drink was introduced in the United States in 1997.[4] Since then, consumption has increased dramatically, with 200 new brands launched between 2006 and 2007.[1] In 2004, 1.5 billion cans of Red Bull were sold in the United States.[5] Although energy drinks are consumed by all age groups, they are particularly popular with young adults: 34 percent of 18- to 24-year-olds regularly consume these drinks.[5]

The growing literature sheds light on acute health problems associated with these products, although they have not been in existence long enough to build a solid, evidence-based appreciation of potential long-term effects. Perhaps the greatest concern about energy drinks is the amount of caffeine they contain, which generally far exceeds that in other beverages. Energy drinks can contain more than 500 mg of caffeine per serving, whereas a cup of coffee has 75 to 150 mg of caffeine and a typical cola has only 35 mg.[1,5] Some of the additional herbs, such as guarana, also contain caffeine. Therefore, the amount of caffeine listed on the label can be less than what is actually in the drink. The effects of drinking large amounts of caffeine range from anxiety, insomnia, and tachycardia, to acute caffeine intoxication and withdrawal.[5]

Additional concerns relate to the effects of other additives and their potential interactions with medications. Bitter orange can cause cardiovascular adverse effects, ginseng can exacerbate bleeding diatheses and lower blood glucose levels, and guarana can affect sleeping and anxiety disorders.[6] As for interactions, 5-hydroxytryptophan should not be combined with monoamine oxidase inhibitors, yohimbine can interact with tricyclic antidepressants and antihypertensives, and ginseng can alter the effectiveness of warfarin (Coumadin) and digoxin.[7]

Children and adolescents are especially vulnerable to the health effects of energy drinks. The large doses of caffeine and stimulants can cause many problems, such as those mentioned. Repeated consumption of these caloric drinks can increase the risk of obesity and dental caries, which already are at epidemic proportions among American youths.[7] The American Academy of Pediatrics has issued a policy statement encouraging clinicians caring for youth to "understand that energy drinks pose potential health risks primarily because of stimulant content; therefore, they are not appropriate for children and adolescents and should never be consumed."[7]

Address correspondence to James MacDonald, MD, at james.macdonald@nationwidechildrens.org. Reprints are not available from the author.

Author disclosure: No relevant financial affiliations to disclose.

REFERENCES

1. Seifert SM, et al. Health effects of energy drinks on children, adolescents, and young adults. *Pediatrics.* 2011;127(3):511-528.
2. USA Swimming. Energy drinks: what you need to know. http://www.usaswimming.org/ViewNewsArticle.aspx?TabId=0&itemid=3955&mid=8712. Accessed March 14, 2012.
3. FDA. Dietary supplements. http://www.fda.gov/food/dietarysupplements/default.htm. Accessed March 14, 2012.
4. Reissig CJ, Strain EC, Griffiths RR. Caffeinated energy drinks—a growing problem. *Drug Alcohol Depend.* 2009;99(1-3):1-10.
5. Heckman MA, et al. Energy drinks: an assessment of their market size, consumer demographics, ingredient profile, functionality, and regulations in the United States. *Comp Rev Food Sci Food Saf.* 2010;9(3):303-317.
6. Clauson KA, et al. Safety issues associated with commercially available energy drinks. *Pharmacy Today.* 2008;14(5):52-64.
7. Committee on Nutrition and the Council on Sports Medicine and Fitness. Sports drinks and energy drinks for children and adolescents: are they appropriate? *Pediatrics.* 2011;127(6):1182-1189. ■