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The “High” Risk of Energy Drinks

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The Food and Drug Administration (FDA) announcement on November 17, 2010, that caffeine is an unsafe food additive to alcoholic beverages will effectively make several “premixed” alcoholic energy drinks prohibited for sale in the United States. Additionally, the Federal Trade Commission has notified manufacturers that they are engaged in the potential illegal marketing of unsafe alcoholic drinks. These rulings have been regarded by some as a welcome response to an increasing public health risk. Scientists and health professionals assisted in the FDA action by arguing that, on the basis of evidence from an increasing number of scientific studies, the direct addition of caffeine to alcoholic beverages does not meet the “generally recognized as safe” standard.¹ Nevertheless, these premixed alcoholic energy drinks are only a fraction of the true public health risk.

In this Commentary, we outline why regular (nonalcoholic) energy drinks might pose just as great a threat to individual and public health and safety. More research that can guide actions of regulatory agencies is needed. Until results from such research are available, the following should be seriously considered: health care professionals should inform their patients of the risks associated with the use of highly caffeinated energy drinks; the public should educate themselves about the risks of energy drink use, in particular the danger associated with mixing energy drinks and alcohol; and the alcohol and energy drink industries should voluntarily and actively caution consumers against mixing energy drinks with alcohol, both on their product labels and in their advertising materials.

Energy drinks are beverages that contain modest to relatively high levels and concentrations of caffeine (range: 50–505 mg caffeine/serving; 2.5–35.7 mg caffeine/oz) compared with other caffeinated beverages such as a 12-ounce cola (range 34–54 mg; 2.9–4.5 mg caffeine/oz) or a 6-ounce cup of coffee (range 77–150 mg; 12.8–25 mg caffeine/oz).² In contrast, energy “shots” are low-volume (1–2 oz) beverages and therefore have an even higher concentration of caffeine than other energy drinks (range 100–350 mg; 90–171 mg caffeine/oz).² Although the actual caffeine concentration in some types of coffee varies substantially, with some levels comparable to that of some energy drinks, coffee is usually consumed hot and therefore more slowly. A major challenge for health professionals and researchers is the

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heterogeneity of the numerous energy drink products available; also the industry is largely unregulated.

Energy drink use is highly prevalent, constituting a \$5.4 billion market in 2006 in the United States alone.² A trip to any college campus would reveal that energy drinks have become enmeshed in the subculture of partying on US college campuses because of the simultaneous consumption of energy drinks with alcoholic beverages.^{3–6} Energy drinks are also popular among non-college-attending adults.

Research shows that energy drink consumption is potentially harmful for 3 reasons. First, caffeine has been clearly associated with adverse health effects in susceptible individuals. Among adolescents, caffeine consumption has been linked to elevated blood pressure⁷ and sleep disturbances.⁸ Among pregnant women, high caffeine intake is associated with risk for late miscarriages, stillbirths,⁹ and small-for-gestational-age infants. Therefore, continued public health awareness regarding high levels of caffeine consumption, no matter what the beverage source, in sensitive individuals is certainly warranted.

Second, the practice of mixing energy drinks with alcohol—which is more widespread than generally recognized—has been linked consistently to drinking high volumes of alcohol per drinking session and subsequent serious alcohol-related consequences such as sexual assault and driving while intoxicated.⁶ Although consumers might be under the impression that caffeine counteracts the adverse effects of alcohol, research has demonstrated that individuals who combine energy drinks with alcohol underestimate their true level of impairment.¹⁰ Although any type of caffeine consumption after a drinking session might reduce sleepiness, it does not alleviate alcohol-related impairment. The state of being less likely to accurately appraise the true level of impairment has been labeled “wide-awake drunkenness” and can lead to engaging in risky behavior. Recent regulatory actions to encourage removal of caffeine from some premixed alcoholic energy drinks should alert consumers that mixing alcohol with highly caffeinated energy drinks carries similar health risks and that this practice is not comparable to consuming mixed drinks such as rum and Coke, which have much lower caffeine concentrations. A second major concern is that simultaneously consuming alcohol and energy drinks can prolong the drinking session by keeping the individual awake longer and therefore may lead to drinking much more alcohol than intended. More data are needed to clarify the association between combining energy drinks with alcohol and the risk of alcohol poisoning.

Third, regardless of whether energy drinks are mixed with alcohol, recent research suggests that, even after adjustment for potential confounders such as heavier drinking patterns, energy drink use might confer a risk for alcohol dependence³ and perhaps nonmedical prescription drug use.⁴ The mechanisms underlying these associations are unclear. The link between energy drink use and alcohol dependence might be attributable to the popularity of mixing alcohol with energy drinks or it might be that alcohol-dependent individuals rely on highly caffeinated beverages to manage hangover effects.

Probably most concerning is the possibility that caffeine's neuropharmacologic effects might play a role in the propensity for addiction. More research is needed to understand the mechanism and to clarify the temporal association of these effects; but taken together with previous research, the message to health professionals, consumers, and the energy drink and alcohol industries should be clear: the consumption of energy drinks mixed with alcohol may have adverse health and safety consequences.

The National Institutes of Health must recognize the lack of systematic research on the health and safety effects of energy drink consumption, especially among adolescents. More research is needed in particular to guide the decision making of regulatory agencies related

to placing a scientifically validated upper limit on the amount of caffeine a manufacturer can include in a single serving of any beverage. Currently, the maximum allowable caffeine limit set by the FDA for cola-like drinks is 0.02%, or 71 mg per 12-oz serving. It is unclear why this limit does not apply to energy drinks; some claim that because energy drinks contain herbal extracts and some vitamins, they are not subject to the same caffeine limit.² Although more research is necessary, so are proactive steps to protect public health. To promote informed consumer choices, regulatory agencies should require specific labeling regarding caffeine content, with warnings about the risks associated with caffeine consumption in adolescents and in pregnant women as well as with explicit information about the potential risks associated with mixing energy drinks with alcohol. Scientists and health professionals cannot wait for further FDA action—available scientific evidence indicates that action is needed now. The collective priority of health professionals should be to educate the public about known risks, and industry officials and servers should caution consumers about the risks of mixing alcohol with energy drinks.

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