A Randomized Trial of Cardiovascular Responses to Energy Drink Consumption in Healthy Adults

Energy drink consumption has been associated with serious cardiovascular events, possibly related to caffeine and other stimulants. We hypothesized that drinking a commercially available energy drink compared with a placebo drink increased blood pressure and heart rate in healthy adults at rest and in response to mental and physical stress (primary outcomes). Furthermore, we hypothesized that these hemodynamic changes are associated with sympathetic activation, which could predispose to increased cardiovascular risk (secondary outcomes).

Methods | We conducted a randomized, double-blind, placebo-controlled, crossover pilot study. The trial protocol is available in the Supplement. Twenty-five healthy volunteers aged 18 years or older, who were nonsmokers, free of known disease, and not taking medications, were recruited by word-of-mouth from the local community. Each participant consumed a can (469 mL, 16 fl oz) of a commercially available energy drink (Beckstir, Rockstar Inc) and placebo drink within 5 minutes, in random order on 2 separate days, maximum 2 weeks apart. The placebo drink, selected to match the nutritional constituents of the energy drink, was similar in taste, texture, and color but lacked caffeine and other stimulants of the energy drink (340 mg of caffeine, 2000 mg of taurine, and extracts of guarana seed, ginseng root, and milk thistle).

The study was approved by the Mayo Clinic Institutional review board. Informed written consent was obtained from participants. Data were collected at the Mayo Clinic Research Unit between August and November 2013. Participants were fasting and abstained from caffeine and alcohol 24 hours prior to each study day. Serum levels of caffeine, plasma glucose, and nitric oxide were measured and blood pressure and heart rate were obtained at baseline and 30 minutes after drink ingestion. Hemodynamic measurements were also obtained during 2 minutes of physical, mental, and cold stressors performed in that order with 10-minute recovery times. Physical stress was performed by asking participants to sustain an isometric handgrip of one-third of maximum voluntary handgrip contraction, using a dynamometer. During mental stress, participants completed seta mathematical tasks as fast as possible. During the cold-pressor test, performed last because of its sustained effects, participants immersed 1 hand into ice water.

Randomization was computer-generated using a randomized block design, with a block size of 6. Results are