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CE - LETTER TO THE EDITOR

## Take the wind out your salis: relationship among energy drink abuse, hypertension, and break-up of cerebral aneurysm

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A 38-year-old man was brought to the emergency department (ED) because of headache, nausea and vomiting starting 7 days prior to being seen. The blood pressure was 180/100 mmHg. A computed tomography (CT scan) of the head was without evidence of pathological signs. Therapy was started with telmisartan and nebivolol with partial relief. He voluntarily discharged himself. The same symptoms and photophobia persisted, and, 2 weeks later, he was admitted to an internal medicine ward. The patient's blood pressure was 160/90 mmHg and antihypertensive therapy was optimized. The initial laboratory findings were normal as well were the neurological examination and the oculi fundus. An electrocardiogram showed a normal sinus rhythm with ST-segment abnormalities. The chest X-ray study and an abdomen ultrasonography were normal. A screening test for secondary hypertension was started. The hormonal pattern was normal except for noradrenaline values that were twofold above the normal range (966 pg/ml), and a slight increase in the values of adrenaline (268 pg/ml) while antihypertensive treatment was given. An echocardiography showed only a first degree diastolic dysfunction with normal wall thickness confirming the recent onset of hypertension. A magnetic resonance imaging (MRI) of kidneys and the renal arteries did not show any stenosis. An MRI of the thorax and abdomen did not show any malignant tumors. Further investigations were needed to clarify the clinical

picture. We investigated whether the patient was a habitual or occasional drug abuser. The patient said he started drinking, about 4 days before symptoms arose, five Red Bull cans/day because of stress in the workplace. An MRI of the head, performed 4 days after admission, showed the presence of a bloody aneurysm of the anterior communicating artery (Fig. 1) and a review of previous tomography, performed during the first admission to hospital, showed that the same aneurysm was ruptured and bleeding. He was immediately transferred to the neurosurgery department, where after a head angiography, a craniotomy micro-surgery occlusion through insertion of clips and exclusion of the aneurysm were performed. Antihypertensive drugs were slowly reduced and were completely withdrawn without secondary effects and complete normalization of blood catecholamines and urinary metanephrine (adrenaline 360 pg/ml; noradrenaline 120 pg/ml; metanephrine 190 µg/dl).

Energy drink consumption has increased markedly in recent years, particularly among young people [1], and this market has grown exponentially in United States. Red Bull is the most popular. A recent survey of college-aged individuals suggests that 51% consume more than one energy drink per month. Moreover, consumption of at least two cans of energy drink daily is frequent among younger adults. Energy drinks claim the ability to produce increased attention, enhanced physical endurance and performance, and improved reaction speed. The major active ingredient in 250 ml of the drink is caffeine (80 mg) but in Red Bull other substances in association with caffeine like taurine (1,000 mg) and glucuronolactone (600 mg) are included. Energy drink consumption has been associated with symptoms of cardiovascular disease. Literature data on this topic are controversial. Some studies show that a single can of Red Bull is not associated with adverse cardiovascular

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**Fig. 1** MRI 3D FSPGR TOF axial. Aneurysm break-up

effects and increased pain tolerance [2], and there are some reports that taurine supplementation can exert a beneficial effect on atherosclerosis prevention. Zulli et al. [3] present data showing that dietary taurine, a downstream metabolite of methionine and cysteine, can ameliorate coronary atherosclerosis and also prevent hyperhomocysteinemia and ameliorated hypermethionemia. On the contrary, a modification of heart rate, systolic and mean blood pressure are present after consumption of two cans of energy drinks as well as an acute increase in platelet aggregation. A reversible postural tachycardia syndrome associated with a vasovagal reaction is reported after an abuse of Red Bull by a young athlete. Moreover, taurine in combination with caffeine significantly increases cardiac stroke volume in young endurance athletes after exercise increasing the release of adrenaline and consequently cardiac output causing mean arterial blood pressure to elevate [4]. Additionally, stressful events in association with caffeine and taurine can trigger more adrenaline release, which

stimulates vasoconstriction, thereby increasing blood pressure further. Previous case–control studies find a significant association between use of caffeine in pharmaceutical products and the risk for aneurysmal subarachnoid hemorrhage defining an association between intracerebral hemorrhage and caffeinated beverages [5]. It may represent the pathophysiology mechanism of the reported aneurysmal rupture caused by the high blood pressure secondary to energy drink abuse. To our knowledge this is the first case that describes a life threatening effect of energy drink abuse specifically the rupture of an aneurysm, and hemorrhage caused by elevated blood pressure levels. It is useful to be aware of energy drinks and potential health consequences associated with their use or abuse.

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**Conflict of interest** None.

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