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Effects of an Energy Drink on Central Biogenic Amines of Wistar Rat Brain

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Over the last decade, the so-called *stimulant drinks* have developed a considerable share of the global market. Nevertheless, the development of these *functional beverages* has been followed by lack of research on the effects of that type of drinks in combination with alcohol and/or fluid loss during exercise.

Stimulant drinks, which are defined as beverages marketed for providing real or perceived enhanced physiological and/or performance effects, contains caffeine and other ingredients including glucuronolactone, taurine and some vitamins of the B complex. Glucuronolactone is a naturally occurring metabolite formed from glucose, and is found in a few foods and drinks of which wine is the richest natural source. Taurine, the second major ingredient of all the *energy drinks*, is present in the diet and is a normal metabolite in humans mainly biosynthesized from cysteine in the liver involved in a number of crucial physiological processes including modulation of calcium flux, neuronal excitability and membrane stabilization. Nevertheless, both taurine and D-glucuronolactone intake after consumption of the so-called *energy drinks* may be much greater than that from the rest of the diet with little knowledge about the effects in humans.

The aim of the present study was to characterize the action of a known *energy drinks* in male Wistar rats in aspects of bio- and neuro-chemical parameters of different parts of the brain. Possible interaction(s) with ethanol were also examined. The energy drink (Red Bull®) was administered to male Wistar rats acutely and sub-acutely. For the acute protocol, animals received single doses of Red Bull® and 1hr later brain samples from four different parts of the brain (hypothalamus, frontal cortex, midbrain and striatum) were selected. The levels of six different biogenic amines (5-HT, 5-HIAA, NA, DA, DOPAC and HVA) were determined by an HPLC system with an analytical column of 250 x 4.6 mm (Jones-Apex, ODS, C-18), 5 μm particle size, coupled to an electrochemical detector. The same measurements were performed for brain samples from the sub-acute experiment (50% Red Bull®, for 4 weeks). Additionally, behavioral tests were performed regarding the dose effects of Red Bull® on both the duration of sleeping time and the general locomotor activity of the Wistar rats.

Concerning the levels of brain biogenic amines, significant changes were reported between control and experimental animals regarding both acute and sub-acute effects. Remarkable differences were not observed when locomotor activity was determined.