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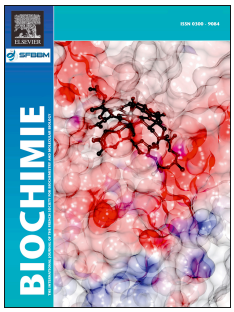

The effect of electronic-cigarettes aerosol on rat brain lipid profile

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Abstract

The electronic cigarettes (e-cigarettes, e-cigs) have become the most sought-after alternative to the traditional cigarettes, partly due to the widespread perception of safety. However, the high temperature reached by e-cig solutions can generate toxic compounds, some of which are listed as known human carcinogens. To evaluate the impact of e-cig aerosol on rat brain lipid profile, twenty male Sprague Dawley rats were exposed to 11 cycles/day (E-cig group), to consume 1 mL/day of e-liquid, for 5 days/week up to 8 weeks. Ten rats were sacrificed after 4 weeks (4w) and ten at the end of treatment (8w). The composition of total fatty acids, sterols and oxysterols of the lipid fraction of rat brains, was analyzed. The results of the E-cig group were compared with those of the control group (not exposed). After 8 weeks, the saturated fatty acids significantly raised up to 7.35 mg/g tissue, whereas polyunsaturated fatty acids decreased reaching 3.17 mg/g. The e-cig vaping increased both palmitic (3.43 mg/g) and stearic acids (3.82 mg/g), while a significant decrement of arachidonic (1.32 mg/g) and docosahexaenoic acids (1.00 mg/g) was found. Atherogenic (0.5) and thrombogenic (1.12) indices also increased in 8w treated animals. The e-cig aerosol significantly impacted the cholesterol homeostasis, since the latter at 8w (21.57 mg/g) was significantly lower than control (24.56 mg/mg); moreover, a significant increase of 7-dehydrocholesterol (1.87 mg/g) was also denoted in e-cig group. The e-cig aerosol also reduced the oxysterols (19.55 µg/g) formation, except triol and 24(S)-hydroxycholesterol (24(S)-HC), diminished after 8 weeks of exposure. The principal component analysis (PCA) separated all E-cig from control groups, evidencing that oxysterols (except triol and 24(S)-HC) were inversely correlated to 7-DHC and TI. The present research revealed that e-cigs aerosol affected the lipid and cholesterol homeostasis in rat brain, which could contribute to the new occurrence of some neurodegenerative diseases.