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Neuronal damages and cognitive impairments induced by electronic cigarette refill liquid in rats: A comparison to nicotine

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Electronic cigarettes, or e-cigarettes, are electrical devices intended to substitute conventional cigarettes, as they simulate the act of smoking. These revolutionary systems are currently moot, not only among health professionals but also in the general population, because the lack of data regarding their safety. In this context, our study was performed in order to assess the impact of electronic cigarette refill liquid (e-liquid) associated or not associated to nicotine at a dose of 0.5 mg/kg of body weight/day or its equivalent of pure nicotine on the central nervous system, particularly on the hippocampus, a critical brain region implied in memory and learning. Treatments were performed intraperitoneally for 28 days. Two experimental paradigms evaluating memory in rats were used: the novel object recognition test and the spontaneous alternation T-maze test. Sub-chronic exposure to e-liquid without nicotine induced cognitive dysfunctions. In fact, e-liquid, per se, showed an amnesic effect. However, supplementation of nicotine partly restored this cognitive decline and partly protected hippocampal neurons against cell death induced by the base e-liquid, highlighting the neuro-protective effect of nicotine. Cell damages observed after treatment with e-liquid associated to nicotine remain significant, highlighting the harmful effects of e-liquid alone. This neurotoxicity, shown by the increase of the activity of lactate dehydrogenase, accompanied by an increased cerebral calcium level can be at the origin of a cerebral excitotoxicity, leading to hippocampal cells death. Electronic cigarette has an important neurotoxic potential that could lead to long-term neurodegenerative diseases installation. Its use as an anti-smoking alternative must be banned.

Biography

Yosra Dallagi is currently pursuing her PhD at the Faculty of Sciences, Tunis University, in the Laboratory of Aggression Physiology and Endocrine Metabolic Studies, in Tunisia.

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