Increased susceptibility to the rewarding effect of Δ^9-Tetrahydrocannabinol (THC) after chronic nicotine exposure through electronic or standard cigarettes

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Marijuana and tobacco are the substances used most commonly by adolescents and co-occurring use is common. Among adolescent tobacco smokers who also smoke marijuana, the frequency of marijuana use was associated with greater levels of nicotine addiction (1). Many smokers have recently switched from standard to electronic cigarettes (e-cig) as an alternative means of nicotine delivery and as smoking cessation aids despite the contrary recommendation of the World Health Organization and the lack of scientific information (2008).

Recently we have validated a new mouse model of smoke exposure (2) and the results show that chronic intermittent exposure to e-cig vapour or tobacco smoke (cig) for 7 weeks has the same effects on nAChR up-regulation, brain nicotine and cotinine levels. Tobacco smoke led to more severe mecamylamine-precipitated withdrawal (WDW) and more evident cognitive deficit 24 hours after cig cessation whereas e-cig vapour elicits more severe anxiety.

Based on these results, the aim of the present work was to test whether e-cig or standard cig exposure could reinforce the subsequent effects of Δ^9-Tetrahydrocannabinol (THC). Thus, 2 or 60 days after exposure, animals were injected i.p. with a low dose (0.01 mg/kg) of THC or vehicle and submitted to Conditioned Place Preference task.

The second aim was to to correlate the behavioural findings with possible neurochemical and neurobiological changes (variations in nicotinic, glutamatergic and cannabinoid receptors level or subtypes and changes in lipid neurotrasmitters/neuromodulators).

Our preliminary results indicate that mice exposed to either e-cig or cig showed a higher sensitivity to THC, compared to control group, in terms of increased time spent in the drug-associated compartment. The increased sensitivity persists up to 60 days from nicotine withdrawal in animals previously exposed to e-cig or cig. Preliminary results indicate that CB1 cannabinoid receptor function is not affected at least in the Nucleus Accumbens. .

In conclusion, our results show that standard tobacco cigarette and e-cigarette exposure induce altered response to THC-induced CPP probably through multiple neurotransmitters involvement.

References

1. Rubinstein et al. 2014 Drug and Alcohol Dependence 141:159–162
2. Ponzoni et al. 2015 Eur Neuropsycopharmacol 25(10):1775-86

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