Abuse Liability of Flavored E-Cigarettes with and without Nicotine
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3P50CA180905-02S1

Abstract:

Human laboratory experiments that test the acute effects of controlled administration of tobacco products on mood enhancement and other indicators of abuse liability can provide low-resource and rapid information to inform FDA regulatory activities. Yet, data that characterizes variation in abuse liability across different types of e-cigarettes are scant, leaving little information to guide FDA regulation. We suspect that flavoring in e-cigarettes is a critical dimension of product diversity that modulates abuse liability because: (1) flavored e-cigarettes mimic the sweetness found in addictive sugary foods (e.g., “chocolate” flavored e-cigarettes); (2) flavoring additives alter combustible tobacco abuse liability; and (3) sweet flavored e-cigarettes may have appetite-suppressing effects independent of nicotine, which enhance abuse liability. Furthermore, nicotine acts as a “reward-enhancer,” such that interactions between nicotine and the other conditioned rewarding stimuli associated with the tobacco self-administration ritual, such as the pleasant taste of smoke and sensations in the airways, synergistically combine to underlie the reinforcing effects of tobacco use. Hence, if the flavoring in e-cigarettes is enjoyable due to its pleasant taste, irrespective of nicotine, flavored e-cigarettes that also have nicotine may have disproportionately higher levels of abuse liability over and above the additive effects of the sensory reward of the flavoring per se and the pharmacological reward of nicotine per se. Young adults may be especially vulnerable to using sweet-flavored e-cigarettes, given their high prevalence of e-cigarette use, propensity to the addictiveness of sugary foods and nicotine, and susceptibility to age-specific marketing of flavored tobacco products. This research aims to conduct an initial laboratory abuse liability determination of sweet flavored e-cigarettes with and without nicotine in young adults. We will leverage the resources of the parent grant by accessing population cores and component projects. Young adult e-cigarette users (18-35 yrs old; N=30) will attend 4 lab visits following 16-hr abstinence in a 2 Flavoring (Sweet vs. Unflavored) × 2 Drug (18 vs. 0 mg/mL) within-subjects double-blind cross-over design. At each visit, the acute effects of a controlled experimental e-cigarette administration on subjective and physiological abuse liability measures (e.g., mood enhancement, nicotine withdrawal suppression, food craving suppression, heart rate) will be tested, as will an objective behavioral task to measure product reinforcement. Based on principles known about the addictive properties of palatable sweet taste, nicotine, and their possible synergistic effects, the primary aims of this study are to test variation in e-cigarette abuse liability as a function of sweet flavoring (Aim 1), nicotine strength (Aim 2), and the putatively synergistic combination of flavor and nicotine (Aim 3). This project is likely to be a methodologically sensitive test of individual and synergistic combinations of flavoring and nicotine effects on abuse liability, which is unknown, yet critical for FDA regulation.