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Neural Markers of Use and Perceptions of E-cigarette Smokers  
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Abstract:

Tobacco is a highly addictive substance and long term use is associated with significant medical morbidity. The main addictive substance in tobacco is nicotine, and recently a device, the e-cigarette has been made available that delivers nicotine without burning tobacco. E-cigarettes are becoming increasingly popular, but very little is known about the effects that e-cigarettes have on brain functioning. In addition, little research has been conducted on the perceptions that smokers have of this new device. The latter is critical because the use of e-cigarettes will be heavily dependent on the perception that smokers have, i.e., whether it is perceived as something that provides similar "effects" as their own cigarette. The proposed research (project 1b of this P30 application) will establish neural biomarkers of e-cigarette use and perception. We will recruit 90 non-treatment seeker cigarette smokers that are willing to refrain from smoking for 24 hours on three occasions. We will use fMRI to measure responses to general reward (sweet juice) and to pictures of cigarettes and e-cigarettes. In addition, we will use pictures displaying the Surgeon General's message about the health effects of cigarettes to evaluate perceptions about the relative health effects of cigarettes and e-cigarettes. This application has three Specific Aims: Aim 1. To determine if e-cigarettes and own cigarettes have similar effects on brain activation during a reward paradigm; 2. To determine if perceptions of e-cigarettes and Surgeon General's warnings affect brain activity during a picture viewing paradigm; and 3. To determine whether reward activity and neural perceptions as measured in Aims 1 and 2 are associated to changes in use of own cigarettes and perceptions, satisfaction, and acceptability of e-cigarettes. The primary significance of this project is establishing, for the first time, the effects of e-cigarette use on brain functioning. A second area of significance is that we will study how perceptions about e-cigarettes alter the neural effects of e-cigarettes (i.e., participants who endorse e-cigarettes as rewarding as their regular cigarettes will have greater neural activity responses). A third area of significance is that we will establish a baseline for the abuse potential of e-cigarettes, by studying effects of e-cigarettes on the brain reward system. Overall, this project will provide critical data to the FDA about possible need for regulation of e-cigarettes and any warnings that may be required.