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Analysis of tobacco alkaloids in cigarettes, little cigars, e-cigarettes and waterpipe tobacco

Brian Thomas¹, Jenny Wiley¹, Melanie Silinski¹, Julie Marusich¹, Steven Meredith², Robert Gahl², Kia Jackson²

¹RTI International, NC, USA, ²Food and Drug Administration, MD, USA

The Tobacco Control Act gives the Food and Drug Administration (FDA) authority to issue product standards for cigarettes and other tobacco products, including electronic cigarettes (e-cigarettes), cigars, and waterpipe tobacco. For example, the FDA recently announced that it intends to regulate and reduce nicotine levels in cigarettes. However, other alkaloids and chemical constituents contained and liberated during the use of tobacco products may have abuse liability and may differ significantly across product types and across brands within a product type. Levels of minor alkaloids could theoretically be manipulated to compensate for decreased nicotine levels. Therefore, the objective of the current study is to analytically characterize the profile of nicotine and non-nicotine constituents produced by different types of tobacco products. Analytical methods were used to determine total particulate matter and concentrations of nicotine, anabasine, anatabine, myosmine, cotinine, nornicotine, harmane, norharmane and acetaldehyde in smoke condensate from cigarettes and little cigars, reconstituted in ethanol. Smoke yields were determined under Health Canada Intense smoke machine conditions. Results reveal modest distinctions between brands within product type, and generally higher analyte exposure levels for little cigars compared to cigarettes, with Djarum Black Clove little cigars producing significantly greater analyte levels than any other product across most measures, including nicotine yield. These results will be used to inform the selection and preparation of aqueous solutions of smoke condensate/aerosol generated from selected tobacco products, which will be evaluated in future studies for their reinforcing effects in a rodent nicotine self-administration procedure. The characterization of the differences in alkaloid production and potential harm (including abuse liability and dependence) caused by different tobacco products and tobacco constituents and their relevance to nicotine reinforcement and self-administration will provide information that may inform future regulatory approaches.