

Nikolina Golob

Mentor: Marcelo Nieto, Timothy McPherson and Jessica Kerr

Title: *Determination of Nicotine Content in E-Cigarettes and E-Liquid Refills Utilizing HPLC Methods*

Electronic cigarettes (e-cigs) are gaining popularity within the youth population, many of whom view vaping as a safer alternative to combustible tobacco. E-cig devices deliver an aerosol produced by heating a liquid mixture of nicotine, flavorings, and other chemicals. The FDA does not currently mandate e-cig labels to disclose the ingredients of the e-liquids used in the devices. The lack of product labeling raises questions about the safety and nicotine content of e-cigs and e-liquids.

The purposes of this study were to assess the amount of nicotine delivered by selected e-cigs during simulated vaping and to quantify the nicotine concentration of e-liquids. Vapors from e-cigs were bubbled through a series of three traps containing water/acetonitrile. Data were obtained in 20 puff intervals, with one puff defined as a 5 second vape pull followed by a 25 second waiting period to allow for vapors to bubble through the entire system. Liquid in the traps was transferred into vials and nicotine concentrations were measured by HPLC. Each e-cig underwent five trials (100 puffs total) to determine the consistency in nicotine concentration over time. E-liquids were diluted and analyzed by HPLC to compare the nicotine concentration to the product label. Five different e-cig models from three different brands were analyzed. One model did not disclose the nicotine content, and the labeled nicotine content on the other 4 models ranged from 2 to 4.6%. The nicotine recovered for 20 puffs ranged from about 10ug/ml to over 100ug/ml. Six different e-liquids (two different brands) with labeled nicotine from 0-6% were analyzed. The amount of nicotine delivered per puff decreased over time for disposable e-cigs. Rechargeable e-cigs were more consistent in nicotine delivery than disposable e-cigs. The nicotine concentration of e-liquid refills varied across brands and were typically lower than the labeled concentration. No nicotine was detected in e-liquid refills labeled as zero nicotine.