
Children's Environmental Health Research Findings
May 2017

Topic: Chemicals in e-cigarettes

Title: Flavoring Chemicals in E-Cigarettes: Diacetyl, 2,3-Pentanedione, and Acetoin in a Sample of 51 Products, Including Fruit-, Candy-, and Cocktail-Flavored E-Cigarettes.

Conclusion: Because of the associations between diacetyl and bronchiolitis obliterans and other severe respiratory diseases observed in workers, urgent action is recommended to further evaluate this potentially widespread exposure via flavored e-cigarettes.

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Abstract: BACKGROUND: There are > 7,000 e-cigarette flavors currently marketed. Flavoring chemicals gained notoriety in the early 2000s when inhalation exposure of the flavoring chemical diacetyl was found to be associated with a disease that became known as "popcorn lung." There has been limited research on flavoring chemicals in e-cigarettes. OBJECTIVE: We aimed to determine if the flavoring chemical diacetyl and two other high-priority flavoring chemicals, 2,3-pentanedione and acetoin, are present in a convenience sample of flavored e-cigarettes. METHODS: We selected 51 types of flavored e-cigarettes sold by leading e-cigarette brands and flavors we deemed were appealing to youth. E-cigarette contents were fully discharged and the air stream was captured and analyzed for total mass of diacetyl, 2,3-pentanedione, and acetoin, according to OSHA method 1012. RESULTS: At least one flavoring chemical was detected in 47 of 51 unique flavors tested. Diacetyl was detected above the laboratory limit of detection in 39 of the 51 flavors tested, ranging from below the limit of quantification to 239 µg/e-cigarette. 2,3-Pentanedione and acetoin were detected in 23 and 46 of the 51 flavors tested at concentrations up to 64 and 529 µg/e-cigarette, respectively. CONCLUSION: Because of the associations between diacetyl and bronchiolitis obliterans and other severe respiratory diseases observed in workers, urgent action is recommended to further evaluate this potentially widespread exposure via flavored e-cigarettes.