Some e-cigarette chemicals mimic nicotine, possibly bypassing regulation

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In what appears to be an effort to bypass public health regulations covering vaping products, some tobacco companies have begun replacing nicotine in e-cigarettes with related chemicals that have similar

properties but unknown health effects, Duke Health researchers report.

In a research letter appearing Aug. 7 in *JAMA*, study authors at Duke and Yale University also found that the quantity of these chemicals, known as nicotine analogs, are not accurately disclosed on the packaging.

"Vaping products containing nicotine are subject to federal laws that prohibit sales to people under the age of 21," said study co-author Sairam V. Jabba, D.V.M., Ph.D., a senior research scientist at Duke University School of Medicine.

"Nicotine analogs are currently not subject to the FDA process and have not been studied for their health effects," Jabba said.

"Our analysis of some of these analog-containing vaping products sold in the U.S. found significant and concerning inaccuracies in the ingredients these products claim to contain and what they actually contain. Further, it's possible manufacturers are attempting to avoid FDA tobacco regulation."

One chemical, known as 6-methyl nicotine, has been shown in rodent experiments to be far more potent than nicotine in targeting the brain's nicotine receptors and more toxic than nicotine. Another, called nicotinamide, is marketed as targeting the same brain receptors as nicotine, despite evidence it does not bind to these receptors.

The nicotine analogs were included in flavored e-cigarettes, which prior research has indicated are preferred by youths and those who vape for the first time.

Jabba and colleagues, including co-senior author Sven Eric Jordt, Ph.D., analyzed an e-cigarette product sold under the brand name Spree Bar, which comes in at least nine flavors and is listed as containing 5%

6-methyl nicotine. Study results showed the actual amount of the chemical was about 88% less than labeled.

The e-cigarettes also included an artificial sweetener that is up to 13,000 times sweeter than table sugar, and an artificial coolant that mimics menthol's effects.

A second brand of e-cigarettes—marketed as Nixotine, Nixodine, Nixamide and Nic-Safe—contained a nicotine analog called nicotinamide, also at levels lower than the labels indicated, and combined with undisclosed amounts of 6-methyl nicotine. This brand did not include sweeteners or coolants.

"These products appear to be designed to circumvent the laws and regulations in place to protect people—especially children—from the harmful effects of smoking and tobacco use," Jordt said.

"We do not know what these chemicals do when they are heated and inhaled. These are questions that should be answered before we allow products on the market."

More information: Variability in Constituents of E-Cigarette Products Containing Nicotine Analogues, *JAMA* (2024). jamanetwork.com/journals/jama/ … 1001/jama.2024.12408

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