



Before You Vape: High levels of Formaldehyde Hidden in E-Cigs

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Formaldehyde, a known human carcinogen found in cigarette smoke, also dwells in the vaporized liquid of popular electronic or e-cigarettes, researchers said Wednesday.

E-cigarette sales are booming in the United States and many hoped so-called "vaping" would replace tobacco smoking and be a panacea for the nearly 160,000 lung cancer deaths associated with conventional cigarettes.

But according to an analysis published Wednesday in the New England Journal of Medicine, the exposure to formaldehyde from e-cigarettes, based on similar chronic use as tobacco, could be five to 15 times higher than from smoking cigarettes.

"It's way too early now from an epidemiological point of view to say how bad they are," said co-author James F. Pankow, professor of chemistry and engineering at Portland State University in Oregon. "But the bottom line is, there are toxins and some are more than in regular cigarettes. And if you are vaping, you probably shouldn't be using it at a high-voltage setting."

Pankow and his colleagues analyzed aerosolized e-liquid in "tank system" e-cigarettes to detect formaldehyde-releasing agents in

"hidden" form at various voltages.

They found that vaping 3 milligrams of e-cigarette liquid at a high voltage can generate 14 milligrams of loosely affiliated or "hidden" formaldehyde. Researchers estimated a tobacco smoker would get .15 milligrams of formaldehyde per cigarette or 3 milligrams in a 20-pack.

Pankow told NBC News those numbers "may be conservative."

"We are not saying e-cigarettes are more hazardous than cigarettes," he said. "We are only looking at one chemical. ... The jury is really out on how safe these drugs are."

There are more than 8,000 chemicals in tobacco smoke, so it's hard to pinpoint whether formaldehyde is the main culprit in cigarette-related cancers.

"A lot of people make the assumption that e-cigarettes are safe and they are perfectly fine after using for a year," said Pankow. "The hazards of e-cigarettes, if there are any, will be seen 10 to 15 years from now when they start to appear in chronic users."

E-cigarettes were first invented in China in 2003, but they started appearing in the United States around 2006. A five-pack of flavor cartridges costs about the same as a pack of cigarettes and starter kits can cost between \$30 and \$100.

[A cartridge or tank contains a liquid](#) of propylene glycol, glycerol, or both, as well as nicotine and flavoring. These chemicals are heated to the boiling point with a battery-operated atomizer, creating a smokeless vapor that is inhaled.

But formaldehyde-containing chemical compounds can be released during the "vaping" process as the liquid is heated. Pankow said

some e-cigarettes can burn hotter than 1,000 degrees fahrenheit. "The difference in e-cigarettes is the material that is heated and turns into hot gas as it cools is not tobacco, but two main chemicals," he said. "When it gets really hot, unwanted reactions occur."

Pankow said the same risks likely do not occur when vaping dry marijuana or hash oil, which typically does not use those chemicals. "But it's totally likely that some people dilute hash oil with propylene glycol and glycerol, which we know can form formaldehyde," he said.

Formaldehyde is a colorless, strong-smelling gas used in embalming fluid, building materials and some medicines and cosmetics. It can also be produced as a byproduct of cooking and smoking.

According to the American Cancer Society, exposure to formaldehyde has been shown to cause cancer in laboratory animals and has also been linked to some cancers in humans.

When gaseous formaldehyde, found in funeral homes and other occupational settings, is inhaled, it breaks down in the mouth, nose, throat, and airways. Exposure has been linked to throat and nasal cancers and leukemias.

<http://www.nbcnews.com/health/cancer/you-vape-high-levels-formaldehyde-hidden-e-cigs-n290826>