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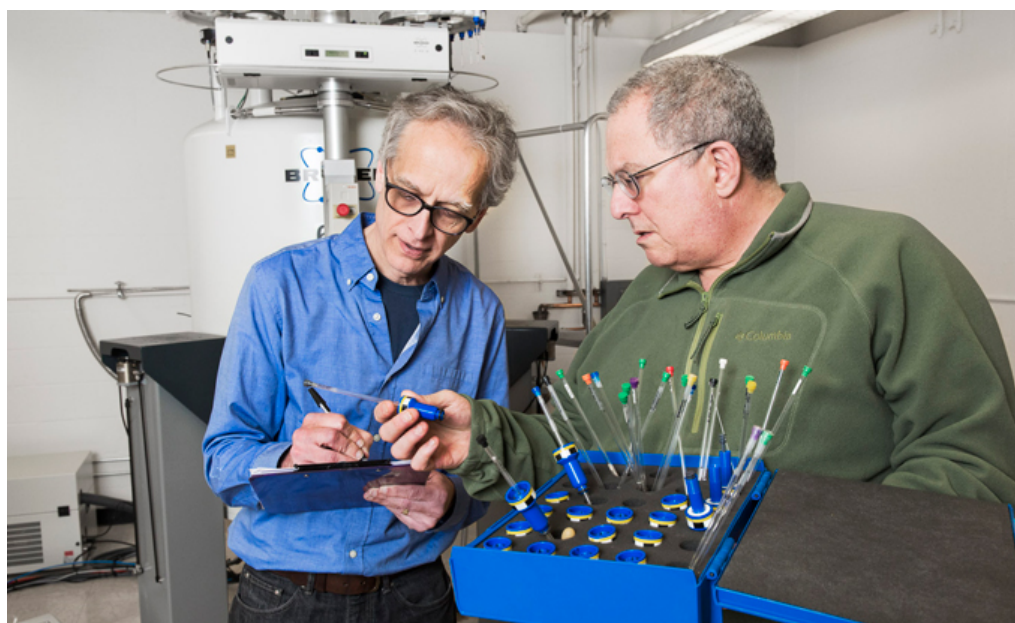


## News

### Clearing the Fog: PSU researchers get the world's attention by linking vaping with formaldehyde

Author: John Kirkland

Posted: May 13, 2015



**ELECTRONIC CIGARETTES** have been clouded in controversy for years as their popularity has grown. By January of this year, 15 states and 275 municipalities throughout the United States had enacted laws restricting where they could be used. Forty-one states restrict their sale to minors. As of this writing, Oregon is considering legislation that would add it to the list.

Most of the controversy centers around the fact that nobody seems to know the health dangers of “vaping,” the act of using an e-cigarette to inhale heat-generated, nicotine-laden vapor. The U.S. Food and Drug Administration doesn’t regulate e-cigarettes or the liquid extracts they use. Vaping advocates say it’s a safer alternative to smoking, and that it can help people get off cigarettes. But the World Health Organization in 2014 issued a report stating that there is not enough evidence to support that claim and called for stricter e-cigarette regulations. It seemed that all impressions of vaping—positive and negative—have been based on unknowns.

At least that was the case until January, when Portland State chemistry faculty James Pankow, David Peyton and Rob Strongin released a study finding that levels of cancer-causing formaldehyde in e-cigarette vapor were up to 15 times higher than in a typical cigarette. They published their findings in the *New England Journal of Medicine*, the news immediately went viral, and the researchers found themselves in the middle of a media firestorm.

Governmental bodies, including Multnomah County, the State of Oregon, and municipalities throughout the United States cited their work as a reason why vaping should be restricted in public places and kept away from children. It seemed that, finally, there was hard evidence that e-cigarettes could be dangerous.

Then came comments from the other side, claiming that the PSU research didn’t reflect the real world of vaping. Critics said the tests showing high formaldehyde levels were done at extreme voltages that the typical “vaper” would never use. New York Times columnist Joe Nocera cited other studies showing that such e-cigarettes had a taste so horrible that people simply could not inhale.

Nocera pointed out that in 2010, 84 percent of current cigarette smokers thought e-cigarettes were a safer alternative, but that number had dropped to 65 percent by 2013. He hinted that the PSU study could drag that number still lower, saying that the study served as a “scare tactic to keep smokers away from e-cigarettes.”

**INSIDE THE LAB**, chemist David Peyton says he is not out to change people’s habits.

"I consider cars to be more evil than cigarettes, and certainly more than e-cigarettes," he says. "I'm not on a crusade for either one. I just put out the data so the regulatory people can look at these things."

He says he was unprepared for the emotional backlash from the publicity surrounding the PSU study. The story of its findings was picked up by at least 179 news outlets on nearly every continent within 10 days of the *New England Journal of Medicine* article. That figure nearly doubled in the following weeks.

"Various news articles took our study and said e-cigarettes are more dangerous than cigarettes. We never said that. But the story took legs, and before you know it people were talking about experiments we didn't do and conclusions we didn't make," he says.



**THE WHOLE THING** actually started when Pankow, whose recent work centered around the candy-like flavorings in tobacco, wanted to find out more about the chemistry of nicotine in vapor form. He teamed up with fellow chemists Peyton and Strongin to measure the presence of the various chemicals the vapor contained. They weren't searching for formaldehyde per se, and were surprised when it showed up in tests at such high levels.

"Our original intent was to look at the flavor molecules. The flavorings they put in tobacco products are deemed safe for eating, but there's no assurance about inhaling. We wanted to see if they survived the vaping process, and we got sidetracked by the formaldehyde," Peyton says.

The team looked at one particular e-liquid, but there are hundreds. The e-cigarette they tested was a common model that a user could find in most stores selling vaping materials. E-cigarettes come in different forms, but all are based on the idea of heating liquid with a battery-powered coil to produce an aerosol that is inhaled. Some vaporizers have adjustable power controls so the user can increase or decrease the amount of vapor produced. The one the PSU team used in the lab was not adjustable, yet it produced formaldehyde.

"The critics say whenever you inhale (at the levels where we found formaldehyde), you stop because it tastes bad," Pankow says. "But that automatically means that you're exposing yourself to those conditions. This level is a known phenomenon.

"Also, it's pretty well known that inhaling cigars is unpleasant, but people do it," he says.

**SINCE THE STUDY** came out, the PSU team, including student assistants Rob Jensen and Zahreh McClure, has been looking at a wider variety of e-cigarette types. They include "drippers" in which the user manually drops liquid onto the heating coil. Drippers produce a bigger vapor hit than other types, and consequently a higher level of formaldehyde than what the researchers found before.

The researchers are preparing a follow-up article for the *New England Journal of Medicine*, which will be published this spring. Peyton said it will address some of the controversies and will show results from the new round of research.

"We are going to fill in the blank between what we did in the original publication about high power vs. low power to show what happens in the middle," he says.

**Author's note:** The PSU research on e-cigarettes was supported by grants from the Penrose Foundation and the Cooley Fund for Critical Research of the Oregon Community Foundation. It also received support from Regina M. and Michael J. Dowd and Patrick J. Coughlin.

*John Kirkland is a staff member in the PSU Office of University Communications.*

**Caption:** Professors David Peyton (left) and Robert Strongin are part of a team that found e-cigarette vapor can contain 15 times higher levels of formaldehyde than regular cigarettes.

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**Thursday, May 14**  
[Texts of Time: The Portland State Book of Hours and the Medieval Manuscript Tradition »](#)

**Thursday, May 14**

## Profile

[Maia Zampini '13 - Inventory Planner, Rejuvenation »](#)

In a recent interview, MBA alumnus Maia Zampini talks about how the PSU MBA program helped her transition