

Cancer-causing benzene found in e-cigarette vapors operated at high power

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Portland State University scientists have found that significant levels of cancer-causing benzene in e-cigarette vapors can form when the devices are operated at high power.

The finding by a research team headed by chemistry professor James F. Pankow were published March 8 in the online journal *PLOS ONE*.

Benzene, a component of gasoline, has been linked to a number of diseases, including leukemia and [bone marrow failure](#). It is found in urban air because of industrial emissions and unburned gasoline in exhaust and fuel tank leakages. It has been named the largest single cancer-risk ambient air toxin in the United States.

The amount of [benzene](#) the PSU scientists measured from e-cigarettes depended greatly on the device. With one device operated at high power, and when the e-cigarette fluid additive chemicals benzoic acid or benzaldehyde were present, benzene [levels](#) were thousands of times higher than in ambient air. The levels, nevertheless, were still 50 to 100 times lower than in smoke from conventional cigarettes, which deliver considerable benzene.

The researchers expect that some e-cigarette advocates will deny the importance of their work by saying "no one vapes at such high powers" or that "the devices tested are not popular among experienced users." In fact, significant benzene was detected in one device at power levels well within the manufacturer's recommended range of power settings. The

power levels used in the study were still far below those accessible to users on some devices, which can exceed 200 watts.

"The fact that vaping can deliver benzene levels many times higher than those found in the ambient atmosphere – where it's already recognized as a cancer risk – should be of concern to anyone using e-cigarettes. Please, stay away from high power if it's available on your device" urged Pankow.

The research team tested three different e-cigarette devices whose designs allow differing amounts of e-cigarette fluid to reach the heating element, as well as differing air flow as the user takes a puff. Of the three devices, the variable-power, tank-type was found to be capable of producing benzene.

The research is the latest in a series from Portland State on the potential health risks of vaping. A PSU paper published last week in *Scientific Reports* showed 15 potentially hazardous chemicals in the liquids used in e-cigarettes. A 2015 PSU study published in the *New England Journal of Medicine* showed that high levels of toxic formaldehyde can be found in e-cigarette vapors formed at high power.

More information: James F. Pankow et al. Benzene formation in electronic cigarettes, *PLOS ONE* (2017). [DOI: 10.1371/journal.pone.0173055](https://doi.org/10.1371/journal.pone.0173055)

Provided by Portland State University

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