

E-cigarette users show cancer-linked genetic changes

February 15 2019, by Leigh Hopper



While studies have indicated that vaping can help smokers quit, USC researchers say the health consequences of using a e-cigarettes may be worse than widely believed. Credit: Photo/Pixabay

If you think vaping is benign, think again

A USC study in 93 people shows that e-cigarette users develop some of the same cancer-related molecular changes in [oral tissue](#) as cigarette smokers, adding to the growing concern that e-cigarettes aren't a harmless alternative to smoking.

The research, published this week in the *International Journal of Molecular Sciences*, comes amid a mushrooming e-cigarette market and mounting public health worries.

On a positive note, recent research found vaping is almost twice as effective as other nicotine replacement therapies in helping smokers quit.

But among adolescents, vaping now surpasses smoking, and there's evidence that e-cigarette use leads to nicotine addiction and future smoking in teens.

"The existing data show that e-cig vapor is not merely '[water vapor](#)' as some people believe," said Ahmad Besaratinia, an associate professor at Keck School of Medicine of USC and the study's senior author.

"Although the concentrations of most carcinogenic compounds in e-cig products are much lower than those in cigarette smoke, there is no safe level of exposure to carcinogens."

E-cigs and cancer: Early warning in oral cells

Besaratinia emphasized that the molecular changes seen in the study aren't cancer, or even pre-cancer, but rather an [early warning](#) of a process that could potentially lead to cancer if unchecked.

The researchers looked at gene expression in oral cells collected from 42 [e-cigarette](#) users, 24 [cigarette smokers](#) and 27 people who didn't smoke or vape. Gene expression is the process by which instructions in our

DNA are converted into a functional product, such as a protein. Certain alterations in [gene expression](#) can lead to cancer.

They focused on oral epithelial cells, which line the mouth. More than 90 percent of smoking-related cancers originate in epithelial tissue, and oral cancer is associated with tobacco use.

Both smokers and vapers showed abnormal expression, or deregulation, in a large number of [genes](#) linked to cancer development. Twenty-six percent of the deregulated genes in e-cig users were identical to those found in smokers. Some deregulated genes found in e-cig users, but not in smokers, are nevertheless implicated in lung cancer, esophageal cancer, bladder cancer, ovarian [cancer](#) and leukemia.

E-cigs and cancer: What's next?

Besaratinia and his team plan to replicate his findings in a larger group of subjects and explore the mechanisms that cause gene deregulation. He's also launching another experiment in which smokers switch to e-cigs; he wants to see whether any changes in gene regulation occur after the switch.

"For the most part, the participants are as curious as we are to know whether these products are safe," he said.

More information: Stella Tommasi et al. Deregulation of Biologically Significant Genes and Associated Molecular Pathways in the Oral Epithelium of Electronic Cigarette Users, *International Journal of Molecular Sciences* (2019). [DOI: 10.3390/ijms20030738](https://doi.org/10.3390/ijms20030738)

Provided by Leigh Hopper

Citation: E-cigarette users show cancer-linked genetic changes (2019, February 15) retrieved 2 February 2024 from <https://medicalxpress.com/news/2019-02-e-cigarette-users-cancer-linked-genetic.html>

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