

Preclinical study suggests E-cigarettes may promote lung cancer in high-risk individuals

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Exposing human lung cells with genetic mutations associated with high risk for lung cancer to the chemicals in electronic-cigarette (e-cigarette) vapor enhanced the cells' cancerous behaviors, according to preliminary results presented here at the AACR-IASLC Joint Conference on the Molecular Origins of Lung Cancer, held Jan. 6–9.

E-cigarettes are battery-powered, electronic nicotine-delivery systems that are rapidly increasing in popularity. They are considered safer than regular cigarettes because they do not combust tobacco or produce smoke. However, very few studies have investigated how e-cigarette use affects [lung function](#) and whether it can promote [lung cancer](#).

"Mutations in the genes P53 and KRAS are often found in the airways of current and former smokers at [high risk](#) for lung cancer," said Stacy J. Park, Ph.D., a postdoctoral fellow at the University of California, Los Angeles. "We found that e-cigarette exposure enhances the aggressive behavior of human lung [epithelial cells](#) that have P53 and KRAS mutations. As a result, we think that e-cigarette exposure could contribute to lung cancer in individuals at high risk for the disease.

"Clearly, our results are very preliminary, and much more research is needed to better establish the role of e-cigarettes in lung cancer," continued Park. "But I think they show that people should approach e-cigarette use with caution and not assume it is safe."

Park and colleagues studied human bronchial epithelial cells carrying mutations in the P53 and KRAS genes. The cells were grown in a liquid medium that had been previously exposed for four hours to e-cigarette vapor or tobacco smoke. The investigators predominantly used nicotine levels estimated to be similar to the nicotine levels to which lung airway cells are exposed during e-cigarette smoking.

Using this approach, the P53- and KRAS-mutant, human bronchial epithelial cells showed cancer-like behaviors irrespective of whether the medium had been generated using e-cigarette vapor or tobacco smoke. Among the cancerous behaviors enhanced by growing the cells in the medium was the ability of the cells to become invasive and to exhibit colony formation, which is a process fundamental to the survival and metastasis of cancer cells.

The researchers also found that changes in gene expression following growth in the medium generated using e-cigarette vapor were very similar to those changes seen when the cells were grown for the same period of time in the medium generated using [tobacco smoke](#).

In immortalized human bronchial epithelial cells with normal P53 and KRAS genes, which model normal airways, the high-nicotine medium generated using e-cigarette vapor was toxic, reducing cell growth and triggering cell death, but it did not cause the [cells](#) to develop cancerous behaviors, according to Park. "Since many users of e-cigarettes are smokers who generally have an elevated risk of developing lung cancer due to the presence of mutations, our data suggest that within this population at high risk for lung cancer, e-cigarettes may be harmful."

Provided by American Association for Cancer Research

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