

Put that in your e-cigarette and smoke it, or should you?

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Smoking cigarettes dramatically increases a person's risk for a host of diseases, and there's an assumption that electronic cigarettes, or e-cigarettes, are not harmful because users do not inhale smoke full of known carcinogens. Findings from the University of North Carolina School of Medicine suggest the story is not that simple.

Ilona Jaspers, PhD, professor of pediatrics and director of the curriculum in toxicology, recently completed research showing how the chemicals in e-cigarettes can change [immune](#) responses in our airways. She will present her findings at the American Association for the Advancement of Science (AAAS) annual meeting in Washington, D.C., February 11-16.

Although the U.S. Food and Drug Administration (FDA) classifies many liquid flavorings in e-cigarettes as "Generally Recognized as Safe," this classification is designated for oral consumption. Most flavoring additives have not been evaluated for potential inhalation toxicity.

"The digestive systems and respiratory systems are very different," said Jaspers, the deputy director of the UNC Center for Environmental Medicine, Asthma and Lung Biology. "Our stomachs are full of acids and enzymes that break down food and deal with chemicals; this environment is very different than our respiratory systems. We simply don't know what effects, if any, e-cigarettes have on our lungs."

Jaspers' lab previously demonstrated that cigarette smoking significantly

impaired the immune responses of mucosal cells within the respiratory system. As part of the UNC School of Medicine's Tobacco Center of Regulatory Science and Lung Health (TCORS) led by Robert Tarran, PhD, Jaspers is now focusing her research efforts on new and emerging tobacco products, like e-cigarettes.

For her study, Jaspers and her team obtained tissue samples of the epithelial layer inside the nasal cavities of smokers, non-smokers, and users of e-cigarettes. The researchers then analyzed changes in the expressions of almost 600 genes involved in the function of the immune responses. They also obtained nasal lavage fluid, urine, and blood samples from participants to study the changes in genetic and proteomic markers of tobacco and nicotine exposure, as well as other markers of inflammation or immune responses. These studies are being conducted in collaboration with investigators from the University of California, San Francisco, as well as Mehmet Kesimer, PhD, another investigator with the TCORS in Lung Health and the Marsico Lung Institute at UNC.

Jaspers' data shows that smoking cigarettes causes suppression of several key immune genes in the nasal mucosa. E-cigarette users showed the same changes in those genes, and they also demonstrated suppression of several additional immune genes, suggesting an even broader effect on the respiratory mucosal [immune response](#) system.

Certain effects of e-cigarettes might depend on the flavoring. In separate experiments using cell cultures, Jaspers' lab examined the effects of cinnamon-flavored e-liquids and cinnamaldehyde - the chemical that makes an e-cigarette taste like cinnamon.

"We found that cinnamaldehyde e-liquids have a significant negative effect on epithelial cell physiology," Jaspers said. "The chemicals compromise the immune function of key respiratory immune cells, such as macrophages, natural killer cells, and neutrophils."

The compromised [immune function](#) of the respiratory immune cells could signal the first in a cascade of cellular mechanisms that lead to impaired immune responses in the lung.

Using translational human in vitro and in vivo approaches, Jaspers' lab hopes to ascertain whether long-term exposure to e-cigarettes - especially those with cinnamon-flavored e-liquids - has immune suppressive effects on the respiratory mucosa of people. If so, this would be a sign that e-cigarettes are not as safe as advertised.

Provided by University of North Carolina Health Care

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