



## The Impact of E-Cigarettes on the Lung

E-cigarettes are a relatively new tobacco product that have been sold in the U.S. for about a decade. The e-cigarettes currently in the U.S. marketplace have not been systemically reviewed by the Food and Drug Administration to determine their impact on lung health. While much remains to be determined about the lasting health consequences of these products, the American Lung Association is very troubled by the evolving evidence about the impact of e-cigarettes on the lungs.

### The Inhalation of Harmful Chemicals Can Cause Irreversible Lung Damage and Lung Disease

In January 2018, the National Academies of Science, Engineering and Medicine<sup>1</sup> released a consensus study report that reviewed over 800 different studies.

*That report made clear: using e-cigarettes causes health risks. It concluded that e-cigarettes both contain and emit a number of potentially toxic substances. The Academies' report also states there is moderate evidence that youth who use e-cigarettes are at increased risk for cough and wheezing and an increase in asthma exacerbations.*



A study from the University of North Carolina found that the two primary ingredients found in e-cigarettes – propylene glycol and vegetable glycerin – are toxic to cells, and that the more ingredients in an e-liquid, the greater the toxicity.<sup>2</sup>



E-cigarettes produce a number of dangerous chemicals including acetaldehyde, acrolein, and formaldehyde. These aldehydes can cause lung disease, as well as cardiovascular (heart) disease.<sup>3</sup>



E-cigarettes also contain acrolein, a herbicide primarily used to kill weeds. It can cause acute lung injury and COPD and may cause asthma and lung cancer.<sup>4</sup>



Both the U.S. Surgeon General and the National Academies of Science, Engineering and Medicine have warned about the risks of inhaling secondhand e-cigarette emissions, which are created when an e-cigarette user exhales the chemical cocktail created by e-cigarettes.



In 2016, the Surgeon General concluded that secondhand emissions contain, “nicotine; ultrafine particles; flavorings such as diacetyl, a chemical linked to serious lung disease; volatile organic compounds such as benzene, which is found in car exhaust; and heavy metals, such as nickel, tin, and lead.”



The Food and Drug Administration has not found any e-cigarette to be safe and effective in helping smokers quit. If smokers are ready to quit smoking for good, they should call 1-800-QUIT NOW or talk with their doctor about finding the best way to quit using proven methods and FDA-approved treatments and counseling.

<sup>1</sup> NAM Report - <https://www.nap.edu/resource/24952/012318ecigaretteConclusionsbyEvidence.pdf>

<sup>2</sup> Sassano MF, Davis ES, Keating JE, Zorn BT, Kochar TK, Wolfgang MC, et al. (2018) Evaluation of e-liquid toxicity using an open-source high-throughput screening assay. *PLoS Biol* 16(3): e2003904. <https://doi.org/10.1371/journal.pbio.2003904>

<sup>3</sup> Ogunwale, Mumiye A et al. (2017) Aldehyde Detection in Electronic Cigarette Aerosols. *ACS omega* 2(3): 1207-1214. doi: 10.1021/acsomega.6b00489.

<sup>4</sup> Bein K, Leikauf GD. (2011) Acrolein - a pulmonary hazard. *Mol Nutr Food Res* 55(9):1342-60. doi: 10.1002/mnfr.201100279.