Electronic (e-) Cigarettes and Secondhand Aerosol

"If you are around somebody who is using e-cigarettes, you are breathing an aerosol of exhaled nicotine, ultra-fine particles, volatile organic compounds, and other toxins," Dr. Stanton Glantz, Director for the Center for Tobacco Control Research and Education at the University of California, San Francisco.

Current Legislative Landscape

- As of January 2, 2014, **108 municipalities and three states include e-cigarettes** as products that are prohibited from use in smokefree environments.

Constituents of Secondhand Aerosol

E-cigarettes do not just emit "harmless water vapor." **Secondhand e-cigarette aerosol (incorrectly called vapor by the industry) contains nicotine, ultrafine particles and low levels of toxins** that are known to cause cancer.

- E-cigarette aerosol is made up of a high concentration of ultrafine particles, and the particle concentration is higher than in conventional tobacco cigarette smoke.[1]

- Exposure to fine and ultrafine particles may exacerbate respiratory ailments like asthma, and constrict arteries which could trigger a heart attack.[2]

- At least 10 chemicals identified in e-cigarette aerosol are on California's Proposition 65 list of carcinogens and reproductive toxins, also known as the Safe Drinking Water and Toxic Enforcement Act of 1986. The compounds that have already been identified in mainstream (MS) or secondhand (SS) e-cigarette aerosol include: **Acetaldehyde (MS), Benzene (SS), Cadmium (MS), Formaldehyde (MS,SS), Isoprene (SS), Lead (MS), Nickel (MS), Nicotine (MS, SS), N-Nitrosonornicotine (MS, SS), Toluene (MS, SS).**[3,4]

- **E-cigarettes contain and emit propylene glycol**, a chemical that is used as a base in e-cigarette solution and is one of the primary components in the aerosol emitted by e-cigarettes.
  - Short term exposure causes eye, throat, and airway irritation.[5]
  - Long term inhalation exposure can result in children developing asthma.[6]

- Even though propylene glycol is FDA approved for use in some products, the inhalation of vaporized nicotine in propylene glycol is not. Some studies show that heating propylene glycol changes its chemical composition, producing small amounts of propylene oxide, a known carcinogen.[7]

- There are **metals in e-cigarette aerosol, including chromium, nickel, and tin nanoparticles**.[8]

- FDA scientists found detectable levels of carcinogenic tobacco-specific nitrosamines in e-cigarette aerosol.[9]

- People exposed to e-cigarette aerosol absorb nicotine (measured as cotinine), with one study showing levels comparable to passive smokers.[10]

- **Diethylene Glycol**, a poisonous organic compound, was also detected in e-cigarette aerosol.[11]

- **Exhaled e-cigarette aerosol contained propylene glycol, glycerol, flavorings, and nicotine, along with acetone, formaldehyde, acetaldehyde, propanal, diacetin, and triacitine.[12]**

- Many of the elements identified in the aerosol are known to **cause respiratory distress and disease.** The aerosol contained particles >1 µm comprised of tin, silver, iron, nickel, aluminum, and silicate and nanoparticles (<100 nm) of tin, chromium and nickel. The concentrations of nine of eleven elements in e-cigarette aerosol were higher than or equal to the corresponding concentrations in conventional cigarette smoke.[13]

- E-cigarettes cause exposure to different chemicals than found in conventional cigarettes and there is a need for risk evaluation for both primary and passive exposure to the aerosol in smokers and nonsmokers.[14]

- Short term use of e-cigarettes has been shown to increase respiratory resistance and impair lung function, which may result in difficulty breathing.[15]
- Overall, e-cigarettes are a new source of **Volatile Organic Compounds (VOCs) and ultrafine/fine particles in the indoor environment,** thus resulting in "passive vaping."[16]

E-cigarette aerosol is a new source of pollution and toxins being emitted into the environment. We do not know the long-term health effects of e-cigarette use and although the industry marketing of the product implies that these products are harmless, the aerosol that e-cigarettes emit is not purely water vapor.

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