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Regional School District No. 7 Testimony

Before the Public Health Committee

In Support Of:

**HB 5449 An Act Prohibiting the Use of Electronic Cigarettes in the Same Places Where Smoking is Prohibited.**

Regional School District No. 7 is in support of HB 5449, An Act Prohibiting the Use of Electronic Cigarettes in the Same Places Where Smoking is Prohibited, for the following reasons:

- The health, safety and wellbeing of our students are our first priority. Vapor produced by electronic cigarettes can contain a high concentration of formaldehyde, a known carcinogen, as reported in the New England Journal of Medicine. E-cigarettes work by heating a liquid that contains nicotine to create a vapor that users inhale. These liquids come in a variety of flavors. Based on our experience, vaping has become increasingly popular with young adults.
- Little research has been done on the effects of e-cigarettes. However, David Peyton, a chemistry professor at Portland State University conducted research that suggests e-cigarettes are not safe. He directed a detailed chemical analysis of the vapor produced by e-cigarettes and found that there was 5-15 times the formaldehyde found in cigarettes when the e-cigarette was set at a high level.
- Vaping is a disruption to the educational environment and occupies the time of our staff and administration. Students and parents are unaware of the addictive nature of vaping products. Some students are leaving the classroom to vape because they are already addicted.
- Unlawful: Some vaping products allow for THC wax, a derivative of marijuana, to be ingested. Some reports indicate that this wax can be up to 80% more potent than smoking marijuana.

- School Buses: Some students are using vaping products on the bus. Other students may feel uncomfortable seeing these products being used or smelling the vapor. There is not enough research to suggest whether or not 2<sup>nd</sup> hand “smoke” is harmful.
- Parent education: We have found that parents are unaware of the hazards associated with the vaping products. There is a misconception that these products are not harmful or addictive.
- Policy Changes: We have updated our smoking policy to include e-cigarettes and vaping products.
- Using e-cigarettes in public places. There is a large amount of aerosol that is emitted into the air from people using the vaping products. The physical effects of second hand aerosol from vaping products has yet to be determined, and therefore should be banned from public places where smoking is prohibited.

Although we have school policies and regulations in place to address this, legislation prohibiting the use of vaping devices in public places would provide another layer of deterrent to students engaging in this unhealthy and addictive act.

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# Hidden Formaldehyde in E-Cigarette Aerosols

N Engl J Med 2015; 372:392-394 | January 22, 2015 | DOI: 10.1056/NEJMc1413069

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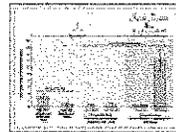
**Hospitalist**

Medical Director, LeConte Medical Center

**To the Editor:**

E-cigarette liquids are typically solutions of propylene glycol, glycerol, or both, plus nicotine and flavorant chemicals. We have observed that formaldehyde-containing hemiacetals, shown by others to be entities that are detectable by means of nuclear magnetic resonance (NMR) spectroscopy,<sup>1</sup> can be formed during the e-cigarette “vaping” process. Formaldehyde is a known degradation product of propylene glycol that reacts with propylene glycol and glycerol during vaporization to produce hemiacetals (Figure 1). These molecules are known formaldehyde-releasing agents that are used as industrial biocides.<sup>5</sup> In many samples of the particulate matter (i.e., the aerosol) in “vaped” e-cigarettes, more than 2% of the total solvent molecules have converted to formaldehyde-releasing agents, reaching concentrations higher than concentrations of nicotine. This happens when propylene glycol and glycerol are heated in the presence of oxygen to temperatures reached by commercially available e-cigarettes operating at high voltage. How formaldehyde-releasing agents behave in the respiratory tract is unknown, but formaldehyde is an International Agency for Research on Cancer group 1 carcinogen.<sup>4</sup>

**FIGURE 1**



Daily Exposures to Formaldehyde Associated with Cigarettes and E-Cigarettes.

Here we present results of an analysis of commercial e-liquid vaporized with the use of a “tank system” e-cigarette featuring a variable-voltage battery. The aerosolized liquid was collected in an NMR spectroscopy tube (10 50-ml puffs over 5 minutes; 3 to 4 seconds per puff). With each puff, 5 to 11 mg of e-liquid was consumed, and 2 to 6 mg of liquid was collected. At low voltage (3.3 V), we did not detect the formation of any formaldehyde-releasing agents (estimated limit of detection, approximately 0.1 µg per 10 puffs). At high voltage (5.0 V), a mean (±SE) of 380±90 µg per sample (10 puffs) of formaldehyde was detected as formaldehyde-releasing agents. Extrapolating from the results at high voltage, an e-cigarette user vaping at a rate of 3 ml per day would inhale 14.4±3.3 mg of formaldehyde per day in formaldehyde-releasing agents. This estimate is conservative because we did not collect all of the aerosolized liquid, nor did we collect any gas-phase formaldehyde. One estimate of the average delivery of formaldehyde from conventional cigarettes is approximately 150 µg per cigarette,<sup>3</sup> or 3 mg per pack of 20 cigarettes. Daily exposures of formaldehyde associated with cigarettes, e-cigarettes from the formaldehyde gas phase, and e-cigarettes from aerosol particles containing formaldehyde-releasing agents are shown in Figure 1.

Inhaled formaldehyde has a reported slope factor of 0.021 kg of body weight per milligram of formaldehyde per day for cancer (<http://oehha.ca.gov/risk/pdf/TCDBcas061809.pdf>). Among persons with a body weight of 70 kg, the incremental lifetime cancer risk associated with long-term cigarette smoking at 1 pack per day may then be estimated at 9×10<sup>-4</sup>. If we assume that inhaling formaldehyde-releasing agents carries the same risk per unit of formaldehyde as the risk associated with inhaling gaseous formaldehyde, then long-term vaping is associated with an incremental lifetime cancer risk of 4.2×10<sup>-3</sup>. This risk is 5 times as high (as compared with the risk based on the calculation of Miyake and Shibamoto shown in Figure 1), or even 15 times as high (as

compared with the risk based on the calculation of Counts et al. shown in Figure 1) as the risk associated with long-term smoking. In addition, formaldehyde-releasing agents may deposit more efficiently in the respiratory tract than gaseous formaldehyde, and so they could carry a higher slope factor for cancer.

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Disclosure forms provided by the authors are available with the full text of this letter at NEJM.org.

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#### 5 References

#### TENNESSEE

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##### Surgery, General

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