

## e-Cigarettes Not the Panacea They Are Claimed to Be, Expert Says

Liam Davenport | December 06, 2016

VIENNA — There is emerging evidence that the use of electronic cigarettes (e-cigarettes) as an aid to smoking cessation may expose "vapers" to health risks that are similar, albeit on a smaller scale, to those seen with smokers, warns a leading expert.

Although there is a lack of consistent evidence sufficient to draw conclusions and the range of available products makes comparison difficult, data presented here at the 17th World Conference on Lung Cancer (WCLC) suggested that there are a number of respiratory problems associated with the use of e-cigarettes, potentially arising from unregulated chemicals in the fluid/vapor.

Presenting the new data, Charlotta Pisinger, MD, PhD, Glostrup University Hospital, Copenhagen, and the Research Center for Prevention and Health, the Capital Region of Denmark, said that it is possible that the potential harms of e-cigarettes are being obscured by studies that have selection biases and that reflect severe conflicts of interest.

Her findings cast doubt over the conclusions of a report by Public Health England (PHE) published last year, which, as [reported](#) by *Medscape Medical News*, claimed that e-cigarettes are about 95% less harmful to health than tobacco cigarettes.

The report was [questioned](#) at the time. Concerns were raised over the quality of the studies cited in the PHE report and the validity of the harm reduction claim.

Dr Pisinger noted: "If we expect health damage, the lung is the primary target organ, and we will expect an increased risk. We don't know which diseases we can expect, but I guess that asthma, COPD [chronic obstructive pulmonary disease], obviously, and even lung cancer cannot definitely be ruled out."

She said: "You heard probably that e-cigarettes are less harmful than conventional cigarettes, and you will of course ask: 'Well, my patient is a reluctant smoker, he is unwilling or unable to quit. Isn't it better for him to switch to e-cigarettes?'"

Dr Pisinger pointed out that the "rationale for harm reduction is that you take a very harmful product and you exchange it with a less harmful product. This is so simple that even the politicians can understand it. The problem is that this is not real life, and the real life is that 8 out of 10 vapers also smoke."

She noted, "The reality is that they don't exchange a harmful product for a less harmful product, but they add on an extra product."

Session cochair Manfred Neuberger, MD, professor of environmental health at the Center of Public Health, Medical University of Vienna, told *Medscape Medical News* that e-cigarettes "can help a minority of smokers, but these are only the smokers who are not willing to quit and who are not willing to take other help from the pharmacy, which is controlled by pharmaceutical legislation."

He said that "it is really a problem" that there is a nicotine product on the market to which unregulated ingredients, such as flavorings, can be added, some of which "were even forbidden in tobacco. We need regulation really badly," he added.

Dr Neuberger highlighted the fact that he recommended that the Austrian government regulate the use of e-cigarettes in the same way as cigarettes are. He noted that to allow the use of the devices in places where smoking is banned undermines the control of tobacco.

"So advertising and distribution is now regulated like tobacco products [in Austria], and I'm very happy, because we don't have to go to stricter regulations like countries like Australia, where they said no marketing at all [of e-cigarettes]," he commented.

#### **Harmful Substances**

Dr Pisinger began her presentation by noting that more than 500 brands of e-cigarettes are currently available and that the current fourth-generation devices are designed to be more customizable and personalized.

In recent years, the tobacco industry has increased exposure in the sector and that aggressive marketing strategies have resulted in an explosion in sales of a product that remains largely unregulated, she said.

The devices deliver a vapor that consists largely of propylene glycol and glycerin in addition to nicotine, often at levels similar to those in cigarettes. There are now more than 8000 flavors available. These flavors are composed of water, alcohol, and a range of chemical additives.

Dr Pisinger said that she conducted a systematic review of the health effects of e-cigarettes, which was [published](#) in 2014. Conducting searches of the PubMed, EMBASE and CINAHL databases, she identified 99 studies, which were assessed in accordance with recommendations from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Recently, the World Health Organization asked her to update that review. In response, she singled out 175 studies for analysis. In a presentation here, she described findings from a further review, which included 235 studies on the health effects of e-cigarettes.

Of those studies, 132 examined the fluid/vapor produced by e-cigarettes, and 46 investigated the adverse effects of the devices. There were 40 human studies and 17 animal studies.

Dr Pisinger found that, generally speaking, e-cigarettes constitute a new research field with many methodologic challenges, in that there is no standard e-cigarette, the majority of studies compare the devices with cigarette smoking, there is a great deal of misleading and missing information on the ingredients, and there are no studies of long-term effects.

Worryingly, 34% of the studies that she identified involved serious conflicts of interest, including 16 studies that were funded by the tobacco industry.

She was nevertheless able to determine from the studies on the fluid/vapor that a number of harmful substances have been identified. These included ultrafine particles, carcinogenic tobacco-specific nitrosamines, and carcinogenic carbonyls that are associated with the development of lung cancer and asthma.

The concentrations of these compounds were typically lower than in cigarettes. The results of different studies were extremely conflicting, she said, with some products having high concentrations. It was notable that studies with severe conflicts of interest were more likely to find that e-cigarettes had little or no harmful effects on health.

Of concern was that many of the flavors contain products that have been approved as safe for oral intake but whose impact when ingested via e-cigarettes is less clear. For example, in one study, diacetyl was found in 75% of samples of e-cigarette. This chemical has been approved for use as a food sweetener, and as such is completely safe, but it has been shown to cause bronchiolitis obliterans in workers who were exposed to it via inhalation.

In cell experiments, fluid/vapor or vapor extract was shown to cause alterations in gene expression, genotoxicity, DNA strand breaks, dose-dependent loss of lung endothelial barrier function, and cytotoxic and inflammatory effects, among other changes.

Increased toxicity has been associated with certain flavors and with the use of high-voltage devices. Increased toxicity has also been associated with overheating, use of certain vaping techniques, and with certain types of vaporizers.

Animal studies have indicated that short-term exposure to e-cigarette vapor can cause diminished alveolar cell proliferation, impairments in postnatal lung growth, asthmatic reactions, and airway inflammation. Longer-term exposure has been linked to asthma and the development of COPD.

In human studies, e-cigarettes have been shown to be associated with significant airway obstruction and nonsignificant decreases in lung function, with effects similar to those seen with smoking, but less pronounced. Other effects have included acute eosinophilic pneumonitis and subacute bronchial toxicity.

Overall, the results on adverse effects associated with e-cigarettes have been conflicting, although Dr Pisinger said that many of the studies that show no effects or decreases in respiratory symptoms with the devices have had selection biases.

A cross-sectional study of over 45,000 Chinese students found that e-cigarette use was associated with significant increases in self-reported respiratory symptoms, physician diagnoses of asthma, and chronic cough, phlegm, or bronchitis symptoms.

Dr Pisinger said: "My conclusions were that there were many methodological problems, many studies with severe conflicts of interest, and that the inconsistencies and contradictions and the rapidly changing design of the products and lack of long-term follow-up mean we cannot draw any firm conclusions.

"But there is an increasing body of evidence indicating harm," she warned.

"Also, it is not meaningful to speak of risk of vaping of e-cigarettes as one product because we find extremely varying results in some e-cigarettes. The risk depends on the brand, the batch, the flavor, the heating, the way of vaping, and many, many other factors, and many of them we still don't know," she added.

*The researchers have disclosed no relevant financial relationships.*

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