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Recent research regarding vaping health risks

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Data keeps mounting regarding the specific harms associated with e-cigarette use. Public health authorities, including Health Canada, need to reevaluate their endorsement of e-cigarettes as reduced-risk alternatives to smoking.

"In terms of the 'continuum of risk' is that, if it is present at all, it is much narrower than the FDA (and lots of others) have assumed. Moreover, many adults who don't 'switch completely' and end up dual users, which is riskier than continuing to just smoke. By promoting the idea — which is not supported by actual disease outcomes — FDA is likely misinforming the public about actual risks of e-cigarettes, including inadvertently promoting them to kids. FDA needs to stop promoting the 'continuum of risk' while it reassesses this strategy based on actual disease outcomes."

— Retired University of California, San Francisco Professor **Stanton Glantz**, February 29, 2024
FDA needs to reconsider its promotion of the "continuum of risk" for e-cigarettes

"Uncertainty should no longer be used as a cover for Canada's harm reduction strategy. Canada's health policies should no longer assume that smokers who switch to e-cigarettes are likely to improve their health, given the greater likelihood that they will become dual users. The government should abandon its 'balanced' approach which tolerates exposing young people and non-smokers to inducements to try vaping in the (unsupported) hopes that such marketing will result in substantial population health benefits"

– **Cynthia Callard**, Executive Director, Physicians for a Smoke-Free Canada, February 27, 2024
Are e-cigarettes safer than regular cigarettes? 107 studies are compiled to provide a disturbing answer

On its webpage titled "Vaping and quitting smoking", Health Canada continues to reference the 2018 National Academies of Sciences, Engineering and Medicine (NASEM) report to claim that "completely switching to vaping is safer than continuing to smoke." However:

"[…] in the science of e-cigarettes, 2018 is ancient history. The NASEM report was a reasonable summary of the evidence on the harms of e-cigarettes as of August 2017, when the literature search it is based on was conducted. As of mid-2017, there were about 2000 peer reviewed papers on e-cigarettes. Today, there are nearly 10,000."

— Retired University of California, San Francisco Professor **Stanton Glantz**, April 16, 2024
Why is the FDA still pushing e-cigs as lower risk based on ancient evidence?

1. **Meta-analysis**, 107 studies: **Glantz SA, Nguyen N, Oliveira da Silva AL**. Population-Based Disease Odds for E-Cigarettes and Dual Use versus Cigarettes. NEJM Evidence 2024; 3(3): DOI: 10.1056/EVIDoa2300229

   "**METHODS**
   Studies in PubMed, EMBASE, Web of Science, and PsychINFO published through October 1, 2023, were pooled in a random-effects meta-analysis if five or more studies were identified with a disease outcome. [...]

   RESULTS
   We identified 124 odds ratios (94 cross-sectional and 30 longitudinal) from 107 studies. [...]"

   "**CONCLUSIONS:** Direct epidemiological evidence based on actual use of e-cigarettes in the general population suggests that, at least for cardiovascular disease, stroke, and metabolic dysfunction, the odds of disease between current e-cigarette and cigarette use were similar. For asthma, COPD, and oral disease, although lower than with cigarettes, the odds of disease were still substantial. Current dual use was associated with 20 to 40% higher odds of disease than smoking, suggesting increased overall population risks for e-cigarettes even for respiratory disease. The available data are also inconsistent with the FDA's assumption, made in its authorizations to sell Vuse Solo, NJOY, and Logic e-cigarettes, and the IQOS heated tobacco product, that dual use is less harmful or, at most, no more harmful than smoking. The dual-use findings are particularly important because dual use is a common behavior among adults who use e-cigarettes that can overcome any population benefit for those who "switch completely" even for respiratory and oral diseases."

   Related Coverage: E-cigs have similar risks to cigs for some diseases and nearly as high for others. Dual use riskier than smoking alone, Prof Glantz 24-02-27

2. **Meta-analysis**, 27 studies: **Siddiqi TJ, Rashid AM, Siddiqi AK, Anwer A, Usman MS, Sakhi H, Bhatnagar A, Hamburg NM, Hirsch GA, Rodriguez CJ, Blaha MJ, DeFilippis AP, Benjamin EJ, Hall ME**. Association of Electronic Cigarette Exposure on Cardiovascular Health: A Systematic Review and Meta-Analysis. Curr Probl Cardiol. 2023 Sep;48(9):101748. doi: 10.1016/j.cpcardiol.2023.101748. Epub 2023 Apr 22. PMID: 37088177.

   "**Literature Search**
   The initial search yielded 620 articles. After screening for duplicates, 607 studies remained. A total of 248 studies were excluded on the basis of title and abstract. All of the remaining articles, including 49 trials, were screened in full text. Finally, 27 studies were deemed eligible for this meta-analysis. Studies were included irrespective of quality assessment. […]"

   "**Conclusion**
   Our study demonstrated a significant, potentially deleterious effect on many short-term cardiovascular hemodynamic parameters and biomarkers, including heart rate, SBP, DBP, MAP, Alx75, and FMD, with acute exposure of EC with nicotine. […]"

3. **Meta-analysis**, 7 studies **: Lau L, Conti AA, Hemmati Z, Baldacchino A**. The prospective association between the use of E-cigarettes and other psychoactive substances in young people: A systematic review and meta-analysis. Neurosci Biobehav Rev. 2023 Oct;153:105392. doi: 10.1016/j.neubiorev.2023.105392. Epub 2023 Sep 14. PMID: 37714228.

   "**Screening strategy**
   […] This resulted in 11 final articles eligible for the review. Of these 11 articles, 7 articles were included in the meta- analysis. […]"

   "**Conclusion**
   In conclusion, there is overwhelming evidence to suggest that the ever use of e-cigarettes as an adolescent or young adult is associated with increased likelihood of subsequent psychoactive substance use, mainly cannabis, alcohol, or Ritalin/Adderall, compared to the never use of e-cigarettes, when adjusted for confounding variables.

   This prospective association is stronger in males or in a location with legalised recreational cannabis use. It also differs by country, considering that this association was found to be not significant in Mexico, but significant in the US and Germany."

4. **Meta-analysis**, over 50 studies: **Hamann SL, Kungskulniti N, Charoenca N, Kasemsup V, Ruangkanchanasetr S, Jongkhajornpong P.** Electronic Cigarette Harms: Aggregate Evidence Shows Damage to Biological Systems. International Journal of Environmental Research and Public Health. 2023; 20(19):6808. https://doi.org/10.3390/ijerph20196808

   "2. **Methods**
   We conducted an overview of the latest evidence in the literature using Pub Med and Google Scholar searches on the health effects of e-cigarettes on the respiratory, cardiovascular, and neurological systems since research on biological system damage from e-cigarettes is expanding. [...] We report over fifty recent review studies with information on their significance in Table 1, Table 2 and Table 3."

   "**Conclusion**
   [...] This paper highlights the following:

   - Recent evidence shows that e-cigarettes are unsafe because of research findings by those studying the effects of e-cigarette use on the respiratory, cardiovascular, and neurological systems. Nicotine addiction is the central driving force of the adverse health effects of new alternative nicotine products. The addictive nature of the drug nicotine necessitates its restriction to protect public health. The rejection of e-cigarette products as consumer goods is essential for preventing e-cigarette nicotine addiction on a population level. [...]"

5. **Review**: **Pipe AL, Mir H**. E-Cigarettes Reexamined: Product Toxicity. Can J Cardiol. 2022 Sep;38(9):1395-1405. doi: 10.1016/j.cjca.2022.08.001. PMID: 36089290.

   "**Abstract**
   […] they have been seen as a "harm reduction" tool that may be of assistance in promoting smoking cessation. Recognition that ENDS can deliver an array of chemicals and materials with known adverse consequences has spurred more careful examination of these products. Nicotine, nitrosamines, carbonyl compounds, heavy metals, free radicals, reactive oxygen species, particulate matter, and "emerging chemicals of concern" are among the constituents of the heated chemical aerosol that is inhaled when ENDS are used. They raise concerns for cardiovascular and respiratory health that merit the attention of clinicians and regulatory agencies. Frequently cited concerns include evidence of disordered respiratory function, altered hemodynamics, endothelial dysfunction, vascular reactivity, and enhanced thrombogenesis. The absence of evidence of the consequences of their long-term use is of additional concern."

6. Study (analysis of 180 e-liquid chemical flavours): **Kishimoto, A., Wu, D. & O'Shea**, D.F. Forecasting vaping health risks through neural network model prediction of flavour pyrolysis reactions. Sci Rep 14, 9591 (2024).

   "**Abstract:**
   […] Vaping involves the heating of chemical solutions (e-liquids) to high temperatures prior to lung inhalation. A risk exists that these chemicals undergo thermal decomposition to new chemical entities, the composition and health implications of which are largely unknown. … Globally harmonized system classifications for NN/MS matches were extracted from PubChem, revealing that 127 acute toxic, 153 health hazard and 225 irritant classifications were predicted. This approach may reveal the longer-term health risks of vaping in advance of clinical diseases emerging in the general population.
   Conclusion:
   […] Results show that while similarities do exist with conventional tobacco smoking, a significantly different profile of hazardous compounds emerges from vaping. As such, using tobacco smoking as the sole comparison for gauging vaping health risks is likely to give a false sense of security, especially for younger non-tobacco smokers."

For further reading,
read this selection of recent articles
on emerging risks of e-cigarette use.