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E-cigarette use and respiratory disorders: an integrative review of converging evidence from epidemiological and laboratory studies

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Epidemiological studies show a relationship of e-cigarette use with asthma and COPD, and laboratory studies show their adverse effects on four biological processes. It can be concluded that e-cigarette use is of significant concern for public health. <https://bit.ly/3drH4pj>

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ABSTRACT

Background: Use of electronic cigarettes (e-cigarettes) is prevalent among adolescents and young adults, but there has been limited knowledge about health consequences in human populations. We conduct a systematic review and meta-analysis of results on respiratory disorders from studies of general-population samples and consider the mapping of these results to findings about biological processes linked to e-cigarettes in controlled laboratory studies.

Method: We conducted a literature search and meta-analysis of epidemiological studies on the association of e-cigarette use with asthma and with COPD. We discuss findings from laboratory studies about effects of e-cigarettes on four biological processes: cytotoxicity, oxidative stress/inflammation, susceptibility to infection and genetic expression.

Results: Epidemiological studies, both cross-sectional and longitudinal, show a significant association of e-cigarette use with asthma and COPD, controlling for cigarette smoking and other covariates. For asthma (n=15 studies), the pooled adjusted odds ratio (aOR) was 1.39 (95% CI 1.28–1.51); for COPD (n=9 studies) the aOR was 1.49 (95% CI 1.36–1.65). Laboratory studies consistently show an effect of e-cigarettes on biological processes related to respiratory harm and susceptibility to illness, with e-cigarette conditions differing significantly from clean-air controls, although sometimes less than for cigarettes.

Conclusions: The evidence from epidemiological studies meets established criteria for consistency, strength of effect, temporality, and in some cases a dose-response gradient. Biological plausibility is indicated by evidence from multiple laboratory studies. We conclude that e-cigarette use has consequences for asthma and COPD, which is of concern for respiratory and public health.