

Tobacco in Australia

Facts & Issues

Relevant news and research

18.6.6 E-cigarette use and the risk of infectious diseases

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Research:

18.6.6 E-cigarette use and the risk of infectious diseases

Zhao M, Han Y, Yang Q, Yue Q, Zhang S, et al. Evaluation of the Effects of e-Cigarette Aerosol Extracts and Tobacco Cigarette Smoke Extracts on RAW264.7 Cells. *ACS Omega*, 2023; 8(32):29336-45.

Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37599962>

Maishan M, Sarma A, Chun LF, Caldera S, Fang X, et al. Aerosolized nicotine from e-cigarettes alters gene expression, increases lung protein permeability, and impairs viral clearance in murine influenza infection. *Front Immunol*, 2023; 14:1076772. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/36999019>

Kotewar SS, Pakhale A, Tiwari R, Reche A, and Singi SR. Electronic Nicotine Delivery System: End to Smoking or Just a New Fancy Cigarette. *Cureus*, 2023; 15(8):e43425. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/37706142>

Jasper AE, Faniyi AA, Davis LC, Grudzinska FS, Halston R, et al. E-cigarette vapor renders neutrophils dysfunctional due to filamentous actin accumulation. *J Allergy Clin Immunol*, 2023. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/37678576>

Agraval H, Crue T, Schaunaman N, Numata M, Day BJ, et al. Electronic Cigarette Exposure Increases the Severity of Influenza a Virus Infection via TRAIL Dysregulation in Human Precision-Cut Lung Slices. *Int J Mol Sci*, 2023; 24(5). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36901724>

Esteban-Lopez M, Perry MD, Garbinski LD, Manevski M, Andre M, et al. Health effects and known pathology associated with the use of E-cigarettes. *Toxicol Rep*, 2022; 9:1357-68. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/36561957>

Campagna D, Amaradio MD, Sands MF, and Polosa R. Respiratory infections and pneumonia: potential benefits of switching from smoking to vaping. *Pneumonia (Nathan)*, 2016; 8:4. Available from:

<https://pubmed.ncbi.nlm.nih.gov/28702284/>

18.6.6.1 Respiratory infections and the defences of the respiratory tract

Arnett, E, & Schlesinger, LS. (2024). E-cigs put the squeeze on macrophages. *Proc Natl Acad Sci U S A*, 121(44), e2418528121. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39432798>

Rahman M, Sompa SI, Introna M, Upadhyay S, Ganguly K, et al. Lipid from electronic cigarette-aerosol both with and without nicotine induced pro-inflammatory macrophage polarization and disrupted phagocytosis. *J Inflamm (Lond)*, 2023; 20(1):39. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/37978397>

Raduka A, Gao N, Chatburn RL, and Rezaee F. Electronic Cigarette Exposure Disrupts Airway Epithelial Barrier Function and Exacerbates Viral Infection. *American Journal of Physiology - Lung Cellular and Molecular Physiology*, 2023. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/37698113>

Zhang R, Jones MM, Parker D, Dornsife RE, Wymer N, et al. Acute vaping exacerbates microbial pneumonia due to calcium (Ca²⁺) dysregulation. *PLoS One*, 2021; 16(8):e0256166. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34383849>

Rebuli ME, Glista-Baker E, Hoffman JR, Duffney PF, Robinette C, et al. E-cigarette Use Alters Nasal Mucosal Immune Response to Live-Attenuated Influenza Virus (LAIV). *American Journal of Respiratory Cell and Molecular Biology*, 2021. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33095645>

Patil SM, Beck PP, Patel TP, Dale Swaney R, Dandachi D, et al. Electronic Vaping-Induced Methicillin-Sensitive Staphylococcus Aureus Pneumonia and Empyema. *Case Rep Infect Dis*, 2021; 2021:6651430. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33747579>

Kalininskiy A, Kittel J, Nacca NE, Misra RS, Croft DP, et al. E-cigarette exposures, respiratory tract infections, and impaired innate immunity: a narrative review. *Pediatric Medicine*, 2021; 4. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34095814>

Chen L, Arens R, Chidambaram AG, Capponi S, Alshawa L, et al. Vaping Associated Pulmonary Nontuberculous Mycobacteria. *Lung*, 2021. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33423072>

Alam MDU, Hussain K, Garedew S, and Imtiaz M. Vaping and Commitment Flu-B Infection Is a Deadly Combination for Spontaneous Pneumomediastinum. *Case Rep Pulmonol*, 2021; 2021:9944491. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34239752>

Tan KS and Wang Y. Vaping and Respiratory Viruses: The End for ENDS? *American Journal of Respiratory Cell and Molecular Biology*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33217237>

Kooragayalu S, El-Zarif S, and Jariwala S. Vaping Associated Pulmonary Injury (VAPI) with superimposed Mycoplasma pneumoniae infection. *Respir Med Case Rep*, 2020; 29:100997. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32042584>

Jasper AE, Sapey E, Thickett D, and Scott A. Comment on "E-cigarette use increases susceptibility to bacterial infection by impairment of human neutrophil chemotaxis, phagocytosis, and NET formation". *Am J Physiol Cell Physiol*, 2020; 318(3):C704-C5. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32150453>

El Chebib H, McArthur K, Gorbonosov M, and Domachowske JB. Anaerobic Necrotizing Pneumonia: Another Potential Life-threatening Complication of Vaping? *Pediatrics*, 2020; 145(4). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32132153>

Crotty Alexander LE and Meier A. Reply to Letter to the Editor: "Comment on 'E-cigarette use increases susceptibility to bacterial infection by impairment of human neutrophil chemotaxis, phagocytosis, and NET formation'". *Am J Physiol Cell Physiol*, 2020; 318(3):C706. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32150454>

Corriden R, Moshensky A, Bojanowski CM, Meier A, Chien J, et al. E-cigarette use increases susceptibility to bacterial infection by impairment of human neutrophil chemotaxis, phagocytosis

and NET formation. *American Journal of Physiology-Cell Physiology*, 2019. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31664858>

Clapp PW, Lavrich KS, van Heusden CA, Lazarowski ER, Carson JL, et al. Cinnamaldehyde in flavored e-cigarette liquids temporarily suppresses bronchial epithelial cell ciliary motility by dysregulation of mitochondrial function. *American Journal of Physiology - Lung Cellular and Molecular Physiology*, 2019; 316(3):L470-L86. Available from: <https://pubmed.ncbi.nlm.nih.gov/30604630/>

Miyashita L, Suri R, Dearing E, Mudway I, Dove Rosamund E, et al. E-cigarette vapour enhances pneumococcal adherence to airway epithelial cells. *European Respiratory Journal*, 2018; 51(2). Available from: <http://erj.ersjournals.com/content/erj/51/2/1701592.full.pdf>

Miler JA and Hajek P. Resolution of chronic nasal *Staphylococcus aureus* infection in a non-smoker who started to use glycerine based e-cigarettes: Antibacterial effects of vaping? *Med Hypotheses*, 2018; 118:42-3. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30037613>

Grigg J. Response to: Electronic cigarette vapour enhances pneumococcal adherence to airway epithelial cells under abnormal conditions of exposure. *European Respiratory Journal*, 2018; 52(3). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30190262>

Wu Q, Jiang D, Minor M, and Chu HW. Electronic cigarette liquid increases inflammation and virus infection in primary human airway epithelial cells. *PLoS One*, 2014; 9(9):e108342. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25244293>

18.6.6.2 Risk of COVID-19 and disease severity

Bowsher, R, Marczylo, TH, Gooch, K, Bailey, A, Wright, MD, & Marczylo, EL. (2024). Smoking and vaping alter genes related to mechanisms of SARS-CoV-2 susceptibility and severity: a systematic review and meta-analysis. *Eur Respir J*, 64(1). Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/38991709>

Valadez-Cuen K, Bhatt T, Mendez IE, Solanki D, Abdi N, et al. E-cigarette Use and Severe Coronavirus Disease 2019 (COVID-19) Outcomes: A Meta-Analysis. *Cureus*, 2024; 16(5):e59591. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38832202>

Scala M, Lugo A, Mosconi G, Zambon A, Odone A, et al. The role of novel nicotine-containing products on SARS-CoV-2 infection and COVID-19 progression. *Eur J Intern Med*, 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38184467>

Grammatopoulos T, Yeoh E, El-Haddad N, Carson-Chahhoud K, and Sitas F. Dual tobacco smoking, electronic cigarette use and COVID-19 outcomes. *Eur J Intern Med*, 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38806370>

Phandthong R, Wong M, Song A, Martinez T, and Talbot P. New insights into how popular electronic cigarette aerosols and aerosol constituents affect SARS-CoV-2 infection of human bronchial epithelial cells. *Scientific Reports*, 2023; 13(1):5807. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37037851>

Parks MJ, Fleischer NL, and Patrick ME. Response to "commentary on 'increased nicotine vaping due to the COVID-19 pandemic among US young adults: Associations with nicotine dependence, vaping frequency, and reasons for use'". *Preventive Medicine*, 2023; 169:107439. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36813251>

Ogwa OA, Abiola AO, Kanma-Okafor OJ, Olufunlayo TF, Shopeyin-Dosunmu AO, et al. Electronic cigarettes use in COVID-19 era among students of a tertiary institution in Nigeria. *Afr J Prim Health Care Fam Med*, 2023; 15(1):e1-e10. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36744451>

Moyers SA, Hartwell M, Chiaf A, Greiner B, Oliver JA, et al. Associations of Combustible Cigarette, Electronic Cigarette, and Dual Use With COVID Infection and Severity in the U.S.: A Cross-sectional Analysis of the 2021 National Health Information Survey. *Tob Use Insights*, 2023; 16:1179173X231179675. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37324057>

Mat Salleh R, Baharom N, Siau CS, Chan CMH, Amit N, et al. E-Cigarette Users' Profiles and Their Association with Identified Impacts of COVID-19 on Vaping among Young Adults in Malaysia. *Healthcare (Basel)*, 2023; 11(3). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36767009>

Kelesidis T, Sharma M, Satta S, Tran E, Gupta R, et al. Ectodomain shedding of proteins important for SARS-CoV-2 pathogenesis in plasma of tobacco cigarette smokers compared to electronic cigarette vapers: a cross-sectional study. *J Mol Med (Berl)*, 2023:1-9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36759357>

Griffin S, DeFoor MG, Bail JR, and Prevost S. Commentary on "Increased nicotine vaping due to the COVID-19 pandemic among US young adults: Associations with nicotine dependence, vaping frequency, and reasons for use". *Preventive Medicine*, 2023:107410. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36849055>

Gallus S, Bosetti C, Gorini G, Stival C, Boffi R, et al. The association between tobacco smoking, second-hand smoke and novel products, and COVID-19 severity and mortality in Italy. Results from the COSMO-IT study. *J Epidemiol*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36843106>

Garcia Colato E, Rosenberg M, Ludema C, Kianersi S, Luetke M, et al. Does cigarette or E-cigarette use increase the risk for SARS-CoV-2 seroconversion among Midwestern college students? *Journal of American College Health*, 2022:1-7. Available from: <https://pubmed.ncbi.nlm.nih.gov/35728069/>

Medeiros AK, Costa FMD, Cerezoli MT, Chaves HL, and Torres US. Differential diagnosis between lung injury associated with electronic cigarette use and COVID-19 pneumonia. *J Bras Pneumol*, 2021; 47(3):e20210058. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34190864>

Li D, Croft DP, Ossip DJ, and Xie Z. The association between statewide vaping prevalence and COVID-19. *Preventive Medicine Reports*, 2020; 20:101254. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33257909>

18.6.6.3 Risk of other infectious diseases

Liu W, Zhu Y, Yan H, Ren L, and Chen J. Nicotine plays a protective role in rats with induced viral pneumonia with polyinosinic-polycytidylic acid through alpha7nAChR. *Heliyon*, 2023; 9(11):e21667. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38027680>

Kuebler WM. (V)apercu on the harm of nicotine e-cigarettes. *European Respiratory Journal*, 2023; 61(6). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37348900>

Elmahdi FM, Aljohani RS, Alharbi NA, Yousef SE, Alharbi NM, et al. A Cytological Study of Oral Human Papillomavirus (HPV) Infection Among Electronic Cigarette Smokers in Al-Madinah Al-Munawara. *Cureus*, 2023; 15(6):e40421. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37456376>

News:

18.6.6 E-cigarette use and the risk of infectious diseases

Rowland M. Study shows e-cigs propylene glycol kills pneumococci, streptococci, staphylococci.

Vapes The Cloud Company. 2017. Available from: <https://www.vapes.com/blogs/news/study-shows-e-cigs-propylene-glycol-kills-pneumococci-streptococci-staphylococci>.

Cooper C. E-cigarettes 'increase the risk of flu and pneumonia' The Independent, 2015. Available from: <http://www.independent.co.uk/life-style/health-and-families/health-news/ecigarettes-increase-the-risk-of-flu-and-pneumonia-10024243.html>

18.6.6.1 Respiratory infections and the defences of the respiratory tract

Gordon S. 'Necrotizing Pneumonia' May Be New Vaping Hazard. WebMD. 2020. Available from: <https://www.webmd.com/lung/news/20200304/necrotizing-pneumonia-may-be-new-vaping-hazard#1>.

Stubley P. Vaping 'linked to 200 health problems in UK including pneumonia'. Independent. 2019. Available from: <https://www.independent.co.uk/news/health/vaping-uk-pneumonia-lung-disease-deaths-us-mhra-e-cigarette-a9125581.html>.

Matthews-King A. E-cigarette fluids and cartridges contain 'bacteria and fungi toxins', study finds. Independent. 2019. Available from: <https://www.independent.co.uk/news/health/vaping-e-cigarette-bacteria-fungus-cigarette-smoking-health-risk-a8882481.html>.

Jaspers I. Perspectives on e-cigarettes from an inhalation toxicologist who is also a mother of teenagers, in ATS Tobacco Action Committee 2019, American Thoracic Society. Available from: <http://www.thoracic.org/advocacy/tobacco-action/perspectives-on-e-cigs.php>.

Rapaport L. Vaping may help pneumonia-causing bacteria invade airways. Reuters. 2018. Available from: <https://www.reuters.com/article/us-health-smoking-vaping-pneumonia/vaping-may-help-pneumonia-causing-bacteria-invade-airways-idUSKCN1GC37M>.

No authors listed. Vaping increases susceptibility to pneumococcal infection. Healio. 2018. Available from: <https://www.healio.com/infectious-disease/respiratory-infections/news/in-the-journals/%7B2a82fbf6-64d5-4a47-bc03-565a1199952e%7D/vaping-increases-susceptibility-to-pneumococcal-infection>.

Chaffin ET. Study Shows E-Cigarette Vapor May Increase Risk of Pneumonia. The Legal Examiner. 2018. Available from: <https://pittsburgh.legalexaminer.com/health/toxic-substances/study-shows-e-cigarette-vapor-may-increase-risk-of-pneumonia/>.

Bodkin H. Vaping risk for elderly as pneumonia link revealed. The Telegraph. 2018. Available from: <http://www.telegraph.co.uk/science/2018/02/08/vaping-risk-elderly-pneumonia-link-revealed/>.

Rutledge R. Handful of cases tie e-cigarettes to lung injury, pneumonia The Seattle Times, 2015. Available from: <http://www.seattletimes.com/nation-world/handful-of-cases-tie-e-cigarettes-to-lung-injury-pneumonia/>

Astrid Miler J, Mayer B, Hajek P. Changes in the frequency of airway infections in smokers who switched to vaping: results of an online survey. *J Addict Res Ther.* 2016;7. Available from: <http://www.omicsonline.org/open-access/changes-in-the-frequency-of-airway-infections-in-smokers-who-switched-to-vaping-results-of-an-online-survey-2155-6105-1000290.php?aid=77944>, [cited 2017 Mar 20], OMICS International. Available from: <http://www.omicsonline.org/open-access/changes-in-the-frequency-of-airway-infections-in-smokers-who-switched-to-vaping-results-of-an-online-survey-2155-6105-1000290.php?aid=77944>.

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