

Tobacco in Australia

Facts & Issues

Relevant news and research

18.6.3 E-cigarette use and cardiovascular disease

Last updated December 2024

Research:	2
18.6.3 E-cigarette use and cardiovascular disease	2
18.6.3.1 Heart attack and coronary heart disease	14
18.6.3.2 Stroke	16
18.6.3.3 Other cardiovascular conditions	17
18.6.3.4 Short-term effects of e-cigarettes on the cardiovascular system	18
18.6.3.5 Cardiovascular effects of e-cigarette use compared to smoking	22
18.6.3.6 Dual use of e-cigarettes and conventional cigarettes	27
18.6.3.7 Animal studies	29
News:	32
18.6.3 E-cigarette use and cardiovascular disease	32
18.6.3.1 Heart attack and coronary heart disease	33
18.6.3.2 Stroke	33
18.6.3.3 Other cardiovascular conditions	34
18.6.3.4 Short-term effects of e-cigarettes on the cardiovascular system	34
18.6.3.5 Cardiovascular effects of e-cigarette use compared to smoking	34
18.6.3.6 Dual use of e-cigarettes and conventional cigarettes	34
18.6.3.7 Animal studies	34

Research:

18.6.3 E-cigarette use and cardiovascular disease

Castellanos, JA, Cornett, CG, Gonzalez, DH, Li, L, Luna, K, Middlekauff, HR et al . (2024). Electronic cigarettes Alter cardiac rhythm and heart rate variability hyperacutely in mice. *Toxicol Appl Pharmacol*, 117174. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39608730>

Elo-Eghosa, E, Li, W, Kalan, ME, Hu, N, & Osibogun, O. (2024). Sex-specific associations of cigarettes and e-cigarettes use with self-reported premature atherosclerotic cardiovascular disease among adults aged 18-54 in the United States. *Prev Med*, 190, 108181. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39557305>

Liu, C, Zhang, Y, Zhao, J, Zhang, J, Meng, Z, Yang, Y et al . (2024). Vaping/e-cigarette-induced pulmonary extracellular vesicles contribute to exacerbated cardiomyocyte impairment through the translocation of ERK5. *Life Sci*, 358, 123195. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39481834>

Lu, Y, Jiang, H, Ren, Y, Wang, M, Yuan, A, Wu, J et al . (2024). Association of the use of e-cigarettes, combustible cigarettes or dual use with hypertension and mortality in hypertensive individuals: Insights from NHANES 2015-2018. *Tob Induc Dis*, 22. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39563721>

Magna, A, Polisen, N, Polisen, L, Bagnato, C, Pacella, E, Carnevale, R et al . (2024). The Hidden Dangers: E-Cigarettes, Heated Tobacco, and Their Impact on Oxidative Stress and Atherosclerosis- A Systematic Review and Narrative Synthesis of the Evidence. *Antioxidants (Basel)*, 13(11). Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39594537>

Munzel, T, Daiber, A, & Prochaska, J. (2024). How quitting, switching to e-cigarettes, or sticking to smoking shapes cardiovascular outcomes after percutaneous coronary intervention. *Eur Heart J*. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39523565>

Munzel, T, Kuntic, M, Stamm, P, & Daiber, A. (2024). E-cigarettes and vaping, new spotlight on smoking as an old cardiovascular risk factor? *Herz*, 49(6), 441-447. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39499272>

Kang, D, Choi, KH, Kim, H, Park, H, Heo, J, Park, TK et al. (2024). Prognosis after switching to electronic cigarettes following percutaneous coronary intervention: a Korean nationwide study. *Eur Heart J*. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39429032>

Alavi, R, Dai, W, Mazandarani, SP, Arechavala, RJ, Herman, DA, Kleinman, MT et al (2024). Adverse Cardiovascular Effects of Nicotine Delivered by Chronic Electronic Cigarettes or Standard Cigarettes Captured by Cardiovascular Intrinsic Frequencies. *J Am Heart Assoc*, 13(18), e035462. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39258553>

Bae, HJ, Jung, HW, & Hong, SP. (2024). More precise method of low-density lipoprotein cholesterol estimation for tobacco and electronic cigarette smokers: A cross-sectional study. *PLoS One*, 19(9), e0309002. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39302923>

Davigo, M, Van Schooten, FJ, Wijnhoven, B, Drittij, MJ, Dubois, L, Opperhuizen, A et al. (2024). Alterations in the molecular regulation of mitochondrial metabolism in human alveolar epithelial cells in response to cigarette- and heated tobacco product emissions. *Toxicol Lett*, 401, 89-100. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39284537>

Yacoub, MI, Aslanoglu, A, Khraim, F, Alsharawneh, A, Abdelkader, R, Almagharbeh, WT et al. (2024). Comparing E-Cigarettes and Traditional Cigarettes in Relation to Myocardial Infarction, Arrhythmias, and Sudden Cardiac Death: A Systematic Review and Meta-Analysis. *Biol Res Nurs*, 10998004241287782. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/39317411>

Zong H, Hu Z, Li W, Wang M, Zhou Q, et al. Electronic cigarettes and cardiovascular disease: epidemiological and biological links. *Pflugers Arch*, 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38376568>

Qananwah Q, Khader A, Al-Hashem M, Mumani A, and Dagamseh A. Investigating the impact of smoking habits through photoplethysmography analysis. *Physiol Meas*, 2024; 45(1). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38176078>

Plurphanswat N, Selya A, and Rodu B. Questionable Effects of Electronic Cigarette Use on Cardiovascular Diseases From the National Health Interview Survey (NHIS, 2014-2021). *Cureus*, 2024; 16(3):e57119. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38681373>

Minetti ET, Erythropel HC, Keith R, Davis DR, Zimmerman JB, et al. Cardiovascular Health Effects and Synthetic Cooling Agents in E-cigarettes Labeled as 'clear' Marketed in Massachusetts After the Tobacco Product Flavoring Ban. *medRxiv*, 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38699355>

Matheson C, Simovic T, Heefner A, Colon M, Tunon E, et al. Evidence of premature vascular dysfunction in young adults who regularly use e-cigarettes and the impact of usage length. *Angiogenesis*, 2024; 27(2):229-43. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38345700>

Li W, Kalan ME, Kondracki AJ, Gautam P, Jebai R, et al. Poor sleep duration and E-cigarette/Cigarette use among US adults with cardiovascular diseases: findings from the 2022 BRFSS cross-sectional study. *Sleep Breath*, 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39192028>

Lee J, Yao Z, Boakye E, and Blaha MJ. The impact of chronic electronic cigarette use on endothelial dysfunction measured by flow-mediated vasodilation: A systematic review and meta-analysis. *Tobacco Induced Diseases*, 2024; 22. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38779295>

Evanoff NG, Dengel DR, Stockelman KA, Fandl H, DeSouza NM, et al. Circulating extracellular microvesicles associated with electronic cigarette use increase endothelial cell inflammation and reduce nitric oxide production. *Exp Physiol*, 2024; 109(9):1593-603. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39092897>

Critselis E and Panagiotakos D. Impact of electronic cigarette use on cardiovascular health: Current evidence, causal pathways, and public health implications. *Angiology*, 2024; 75(5):417-24. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36913951>

Cirillo P, Morello M, Titolo G, Marra L, Morello A, et al. E-Cigarettes induce expression of procoagulant tissue factor in cultivated human endothelial cells. *J Thromb Thrombolysis*, 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39207592>

Chaturvedi D, Attia Hussein Mahmoud H, Isaac A, Atla RH, Shakeel JN, et al. Understanding the Cardiovascular Fallout of E-cigarettes: A Comprehensive Review of the Literature. *Cureus*, 2024; 16(6):e63489. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39081430>

Chandy M, Hill T, 3rd, Jimenez-Tellez N, Wu JC, Sarles SE, et al. Addressing Cardiovascular Toxicity Risk of Electronic Nicotine Delivery Systems in the Twenty-First Century: "What Are the Tools Needed for the Job?" and "Do We Have Them?". *Cardiovasc Toxicol*, 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38555547>

Boss S, Bertolio M, and Lipke L. Inflammatory biomarker changes in healthy adults secondary to electronic cigarette use: A scoping review. *Immun Inflamm Dis*, 2024; 12(2):e1170. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38353387>

Youn JY, Middlekauff HR, Reudiseuli I, Huang K, and Cai H. Endothelial damage in young adult e-cigarette users. *Redox Biol*, 2023; 62:102688. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37018969>

Siddiqi TJ, Rashid AM, Siddiqi AK, Anwer A, Usman MS, et al. Association of Electronic Cigarette Exposure on Cardiovascular Health: A Systematic Review and Meta-Analysis. *Curr Probl Cardiol*, 2023:101748. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37088177>

Rose JJ, Krishnan-Sarin S, Exil VJ, Hamburg NM, Fetterman JL, et al. Cardiopulmonary impact of electronic cigarettes and vaping products: A scientific statement from the American Heart Association. *Circulation*, 2023; 148(8):703-28. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37458106>

Rezk-Hanna M, Rossman MJ, Ludwig K, Sakti P, Cheng CW, et al. Electronic Hookah (Waterpipe) Vaping Reduces Vascular Endothelial Function: The Role of Nicotine. *Am J Physiol Heart Circ Physiol*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38133618>

Rahman A, Alqaisi S, Alzakhari R, and Saith S. Characterization and Summarization of the Impact of Electronic Cigarettes on the Cardiovascular System: A Systematic Review and Meta-Analysis. *Cureus*, 2023; 15(5):e39528. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37366450>

Mears MJ, Hookfin HL, Bandaru P, Vidal P, Stanford KI, et al. Electronic Nicotine Delivery Systems and Cardiovascular/Cardiometabolic Health. *Circ Res*, 2023; 132(9):1168-80. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37104558>

McCaughey CJ, Murphy G, Jones J, Mirza KB, and Hensey M. Safety and efficacy of e-cigarettes in those with atherosclerotic disease: a review. *Open Heart*, 2023; 10(2). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38065586>

Luca AC, Curpan AS, Iordache AC, Mindru DE, Tarca E, et al. Cardiotoxicity of Electronic Cigarettes and Heat-Not-Burn Tobacco Products-A Problem for the Modern Pediatric Cardiologist. *Healthcare (Basel)*, 2023; 11(4). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36833024>

Kucera C, Ramalingam A, Srivastava S, Bhatnagar A, and Carll AP. Nicotine Formulation Influences the Autonomic and Arrhythmogenic Effects of Electronic Cigarettes. *Nicotine & Tobacco Research*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38011908>

Krabbe B, Espinola-Klein C, Malyar N, Brodmann M, Mazzolai L, et al. Health effects of e-cigarettes and their use for smoking cessation from a vascular perspective. *Vasa*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36734252>

Koupidis SA. Public Health Concerns from Increased Use of Electronic Cigarette Use. *Angiology*, 2023;33197231225283. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38149822>

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>

Kloner RA. Marijuana and electronic cigarettes on cardiac arrhythmias. *Heart Rhythm*, 2023; 20(1):87-8. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36603938>

Jones CA, Wallace MJ, Bandaru P, Woodbury ED, Mohler PJ, et al. E-cigarettes and arrhythmogenesis: a comprehensive review of preclinical studies and their clinical implications. *Cardiovasc Res*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37517059>

Han SG, Sille FC, Mihalic JN, and Rule AM. The relationship between the use of electronic nicotine delivery systems (ENDS) and effects on pulmonary immune responses-a literature review. *Environmental Research*, 2023; 221:115234. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36634896>

Hamann SL, Kungskulniti N, Charoenca N, Kasemsup V, Ruangkanchanasetr S, et al. Electronic Cigarette Harms: Aggregate Evidence Shows Damage to Biological Systems. *International Journal of Environmental Research and Public Health*, 2023; 20(19). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37835078>

Halstead KM, Wetzel EM, Cho JL, and Stanhewicz AE. Sex Differences in Oxidative Stress-Mediated Reductions in Microvascular Endothelial Function in Young Adult e-Cigarette Users. *Hypertension*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37800370>

Fountoulakis P, Theofilis P, Tsalamandris S, Antonopoulos AS, Tsioufis P, et al. The cardiovascular consequences of electronic cigarette smoking: a narrative review. *Expert Rev Cardiovasc Ther*, 2023;1-11. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37755116>

Espinoza-Derout J, Arambulo JML, Ramirez-Trillo W, Rivera JC, Hasan KM, et al. The lipolysis inhibitor acipimox reverses the cardiac phenotype induced by electronic cigarettes. *Scientific Reports*, 2023; 13(1):18239. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37880325>

Damay VA, Setiawan, Lesmana R, Akbar MR, Lukito AA, et al. Aerobic Exercise versus Electronic Cigarette in Vascular Aging Process: First Histological Insight. *Int J Vasc Med*, 2023; 2023:8874599. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37533734>

Alzahrani T, Alhazmi MF, Alharbi AN, AlAhmadi FT, Alhubayshi AN, et al. The Prevalence of Electronic Cigarette Use Among College Students of Taibah University and Symptoms of Cardiovascular Disease. *J Saudi Heart Assoc*, 2023; 35(2):163-8. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/37404746>

Abd Rami AZ, Aminuddin A, Hamid AA, Mokhtar MH, and Ugusman A. Nicotine Impairs the Anti-Contractile Function of Perivascular Adipose Tissue by Inhibiting the PPARgamma-Adiponectin-AdipoR1 Axis. *Int J Mol Sci*, 2023; 24(20). Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/37894791>

Correction to: How Irritating! Electronic Cigarettes Not "95% Safer" Than Combustible Cigarettes: Recent Mechanistic Insights Into Endothelial Dysfunction. *Arterioscler Thromb Vasc Biol*, 2023; 43(1):e65. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36542727>

Siegel J, Patel SH, Mankaliye B, and Raval AP. Impact of Electronic Cigarette Vaping on Cerebral Ischemia: What We Know So Far. *Transl Stroke Res*, 2022. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/35435598>

Seri A, Rattanawong P, Firouzbakht T, and Sorajja D. Vaping tetrahydrocannabinol unmasks Brugada pattern and induces ventricular fibrillation in Brugada syndrome: a case report. *Eur Heart J Case Rep*, 2022; 6(6):ytac200. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35693027>

Rao P, Han DD, Tan K, Mohammadi L, Derakhshandeh R, et al. Comparable impairment of vascular endothelial function by a wide range of electronic nicotine delivery devices. *Nicotine & Tobacco Research*, 2022; 24(7):1055-62. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35100430>

Neczypor EW, Mears MJ, Ghosh A, Sassano MF, Gumina RJ, et al. E-Cigarettes and Cardiopulmonary Health: Review for Clinicians. *Circulation*, 2022; 145(3):219-32. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/35041473>

Mohammadi L, Han DD, Xu F, Huang A, Derakhshandeh R, et al. Chronic E-Cigarette Use Impairs Endothelial Function on the Physiological and Cellular Levels. *Arterioscler Thromb Vasc Biol*, 2022; 42(11):1333-50. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36288290>

Michon M, Mercier C, Petit C, Leclerc L, Bertoletti L, et al. In Vitro Biological Effects of E-Cigarette on the Cardiovascular System-Pro-Inflammatory Response Enhanced by the Presence of the Cinnamon Flavor. *Toxics*, 2022; 10(12). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36548617>

Mekala N, Gheewala N, Rom S, Sriram U, and Persidsky Y. Blocking of P2X7r Reduces Mitochondrial Stress Induced by Alcohol and Electronic Cigarette Exposure in Brain Microvascular Endothelial Cells. *Antioxidants (Basel)*, 2022; 11(7). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35883819>

McNeill A, Simonavičius E, Brose L, Taylor E, East K, et al. Nicotine vaping in England: 2022 evidence update. A report commissioned by the Office for Health Improvement and Disparities. London: Office for Health Improvement and Disparities 2022. Available from:

<https://www.gov.uk/government/publications/nicotine-vaping-in-england-2022-evidence-update>.

Liu X, Yuan Z, and Ji Y. The association between electronic cigarettes, sleep duration, and the adverse cardiovascular outcomes: Findings from behavioral risk factor surveillance system, 2020. *Front Cardiovasc Med*, 2022; 9:909383. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36277785>

Grech AK, Keating DT, Garner DJ, and Naughton MT. A case of extreme carboxyhaemoglobinemia due to vaping. *Respirol Case Rep*, 2022; 10(5):e0942. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35433009>

Fried ND, Oakes JM, Whitehead AK, Lazartigues E, Yue X, et al. Nicotine and novel tobacco products drive adverse cardiac remodeling and dysfunction in preclinical studies. *Front Cardiovasc Med*, 2022; 9:993617. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36277777>

Espinoza-Derout J, Shao XM, Lao CJ, Hasan KM, Rivera JC, et al. Electronic Cigarette Use and the Risk of Cardiovascular Diseases. *Front Cardiovasc Med*, 2022; 9:879726. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35463745>

El-Mahdy MA, Ewees MG, Eid MS, Mahgoup EM, Khaleel SA, et al. Electronic Cigarette Exposure Causes Vascular Endothelial Dysfunction Due to NADPH Oxidase Activation and eNOS Uncoupling. *Am J Physiol Heart Circ Physiol*, 2022. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35089811>

Echeagaray O, Savko C, Gallo A, and Sussman M. Cardiovascular consequences of vaping. *Current Opinion in Cardiology*, 2022; 37(3):227-35. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35612935>

Ding R, Ren X, Sun Q, Sun Z, and Duan J. An integral perspective of canonical cigarette and e-cigarette-related cardiovascular toxicity based on the adverse outcome pathway framework. *J Adv Res*, 2022. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35998874>

Damay VA, Setiawan S, Lesmana R, Akbar MR, and Lukito AA. How Electronic Cigarette Affects the Vascular System. *J Smok Cessat*, 2022; 2022:3216580. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36262466>

Cozzolino C, Picchio V, Floris E, Pagano F, Saade W, et al. Modified risk tobacco products and cardiovascular repair: still very smoky. *Curr Stem Cell Res Ther*, 2022. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35927909>

Berlowitz JB, Xie W, Harlow AF, Hamburg NM, Blaha MJ, et al. E-cigarette use and risk of cardiovascular disease: A longitudinal analysis of the PATH study (2013-2019). *Circulation*, 2022; 145(20):1557-9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35514292>

Amraotkar AR, Owolabi US, Malovichko MV, Majid S, Weisbrod RM, et al. Association of electronic cigarette use with circulating angiogenic cell levels in healthy young adults: Evidence for chronic systemic injury. *Vasc Med*, 2022:1358863X221126205. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36503365>

Tarran R, Barr RG, Benowitz NL, Bhatnagar A, Chu HW, et al. E-Cigarettes and Cardiopulmonary Health. *Function (Oxf)*, 2021; 2(2):zqab004. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33748758>

Shahandeh N, Chowdhary H, and Middlekauff HR. Vaping and cardiac disease. *Heart*, 2021. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33574049>

Rezk-Hanna M, Seals DR, Rossman MJ, Gupta R, Nettle CO, et al. Ascorbic Acid Prevents Vascular Endothelial Dysfunction Induced by Electronic Hookah (Waterpipe) Vaping. *J Am Heart Assoc*, 2021; 10(5):e019271. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33615833>

Majid S, Keith RJ, Fetterman JL, Weisbrod RM, Nystoriak J, et al. Lipid profiles in users of combustible and electronic cigarettes. *Vasc Med*, 2021:1358863X211009313. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34013801>

Khadka S, Awasthi M, Lamichhane RR, Ojha C, Mamudu HM, et al. The Cardiovascular Effects of Electronic Cigarettes. *Current Cardiology Reports*, 2021; 23(5):40. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33694009>

Keith R and Bhatnagar A. Cardiorespiratory and Immunologic Effects of Electronic Cigarettes. *Curr Addict Rep*, 2021:1-11. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33717828>

Bianco E, Skipalskyi A, Goma F, Odeh H, Hasegawa K, et al. E-Cigarettes: A New Threat to Cardiovascular Health - A World Heart Federation Policy Brief. *Glob Heart*, 2021; 16(1):72. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34900563>

Alarabi AB, Lozano PA, Khasawneh FT, and Alshbool FZ. The effect of emerging tobacco related products and their toxic constituents on thrombosis. *Life Sci*, 2021; 290:120255. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34953893>

Vindhya MR, Okut H, Ablah E, Ndunda PM, Kallail KJ, et al. Cardiovascular Outcomes Associated With Adult Electronic Cigarette Use. *Cureus*, 2020; 12(8):e9618. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32923219>

Tsai M, Byun MK, Shin J, and Alexander LEC. Effects of E-cigarettes and vaping devices on cardiac and pulmonary physiology. *The Journal of physiology*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32975834>

Shea JB, Aguilar M, Sauer WH, and Tedrow U. Unintentional magnet reversion of an implanted cardiac defibrillator by an electronic cigarette. *HeartRhythm Case Rep*, 2020; 6(3):121-3. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32195116>

Seiler-Ramadas R, Sandner I, Haider S, Grabovac I, and Dorner TE. Health effects of electronic cigarette (ecigarette) use on organ systems and its implications for public health. *Wien Klin Wochenschr*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32691214>

Schmidt F, Daiber A, and Munzel T. Long-term cardiovascular risk of e-cigarettes. *European Heart Journal*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32077936>

Sakhamuri S, Goji S, and Teelucksingh S. Case Report: Flavored Vaping-Associated Hypokalemia. *American Family Physician*, 2020; 102(2):74-6. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32667173>

Rao P, Liu J, and Springer ML. JUUL and combusted cigarettes comparably impair endothelial function. *Tobacco Regulatory Science*, 2020; 6(1):30-7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31930162>

Ramirez JEM, Karim ZA, Alarabi AB, Hernandez KR, Taleb ZB, et al. The JUUL e-cigarette elevates the risk of thrombosis and potentiates platelet activation. *Journal of Cardiovascular Pharmacology and Therapeutics*, 2020; 25(6):578-86. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32691614>

Rader F, Rashid M, Nguyen TT, Luong E, Kim A, et al. E-cigarette use and subclinical cardiac effects. *Circulation Research*, 2020; 127(12):1566-7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33043813>

Pulvers K, Nollen NL, Rice M, Schmid CH, Qu K, et al. Effect of Pod e-Cigarettes vs Cigarettes on Carcinogen Exposure Among African American and Latinx Smokers: A Randomized Clinical Trial. *JAMA Netw Open*, 2020; 3(11):e2026324. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33206193>

Peruzzi M, Biondi-Zoccai G, Carnevale R, Cavarretta E, Frati G, et al. Vaping Cardiovascular Health Risks: an Updated Umbrella Review. *Curr Emerg Hosp Med Rep*, 2020:1-7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32837803>

Perk J. The rise and fall of e-cigarettes according to Aesop : Editorial regarding EAPC position paper 'Electronic cigarettes and health with special focus on cardiovascular effects'. *European Journal of Preventive Cardiology*, 2020:2047487320938907. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32726571>

Navas-Acien A, Martinez-Morata I, Hilpert M, Rule A, Shimbo D, et al. Correction to: Early Cardiovascular Risk in E-Cigarette Users: the Potential Role of Metals. *Current Environmental Health Reports*, 2020; 7(4):362. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33326088>

Navas-Acien A, Martinez-Morata I, Hilpert M, Rule A, Shimbo D, et al. Early Cardiovascular Risk in E-cigarette Users: the Potential Role of Metals. *Current Environmental Health Reports*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33242201>

Mobarrez F, Antoniewicz L, Hedman L, Bosson JA, and Lundback M. Electronic cigarettes containing nicotine increase endothelial and platelet derived extracellular vesicles in healthy volunteers. *Atherosclerosis*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32122618>

Middlekauff HR. Cardiovascular effects of electronic cigarettes. *Nature Reviews Cardiology*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32231329>

Lynch J, Jin L, Richardson A, and Conklin DJ. Tobacco Smoke and Endothelial Dysfunction: Role of Aldehydes? *Curr Hypertens Rep*, 2020; 22(9):73. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32857217>

Liew CH. Potential cardiovascular implications of electronic cigarettes: how evident is the evidence? *J Public Health (Oxf)*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32827043>

Lechasseur A and Morissette MC. The fog, the attractive and the addictive: pulmonary effects of vaping with a focus on the contribution of each major vaping liquid constituent. *Eur Respir Rev*, 2020; 29(157). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33060167>

Lai L and Qiu H. Biological Toxicity of the Compositions in Electronic-Cigarette on Cardiovascular System. *J Cardiovasc Transl Res*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32748205>

Kuntic M, Hahad O, Daiber A, and Munzel T. Could E-cigarette vaping contribute to heart disease? *Expert Review of Respiratory Medicine*, 2020:1-9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32757856>

Kelesidis T, Tran E, Arastoo S, Lakhani K, Heymans R, et al. Elevated Cellular Oxidative Stress in Circulating Immune Cells in Otherwise Healthy Young People Who Use Electronic Cigarettes in a Cross-Sectional Single-Center Study: Implications for Future Cardiovascular Risk. *J Am Heart Assoc*, 2020; 9(18):e016983. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32896211>

Kavousi M, Pisinger C, Barthelemy J-C, Smedt DD, Koskinas K, et al. Electronic cigarettes and health with special focus on cardiovascular effects: position paper of the European Association of Preventive Cardiology (EAPC). *European Journal of Preventive Cardiology*, 2020; 0(0):2047487320941993. Available from: <https://journals.sagepub.com/doi/abs/10.1177/2047487320941993>

Jessri M, Sultan AS, Magdy E, Hynes N, and Sultan S. Nicotine e-vaping and cardiovascular consequences: a case series and literature review. *Eur Heart J Case Rep*, 2020; 4(6):1-7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33437920>

Gorna I, Napierala M, and Florek E. Electronic Cigarette Use and Metabolic Syndrome Development: A Critical Review. *Toxics*, 2020; 8(4). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33212878>

Garcia PD, Gornbein JA, and Middlekauff HR. Cardiovascular autonomic effects of electronic cigarette use: a systematic review. *Clin Auton Res*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32219640>

Cossio R, Cerra ZA, and Tanaka H. Vascular effects of a single bout of electronic cigarette use. *Clinical and Experimental Pharmacology and Physiology*, 2020; 47(1):3-6. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31531991>

Benedikter BJ and Koenen RR. Vaping, vapor, vesicles! Electronic cigarettes provoke vascular extracellular vesicle release in healthy volunteers. *Atherosclerosis*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32305177>

Basma H, Tatineni S, Dhar K, Qiu F, Rennard S, et al. Electronic cigarette extract induced toxic effect in iPSC-derived cardiomyocytes. *BMC Cardiovasc Disord*, 2020; 20(1):357. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32758132>

Baines DL. A nasty case of the vapours - e-cigarettes friend or foe? *The Journal of physiology*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33006134>

Correction to: Letter by Herzig Regarding Article, "Electronic Cigarettes: A Scientific Review".
Circulation, 2020; 141(19):e807. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32392106>

Skotsimara G, Antonopoulos AS, Oikonomou E, Siasos G, Ioakeimidis N, et al. Cardiovascular effects of electronic cigarettes: A systematic review and meta-analysis. *European Journal of Preventive Cardiology*, 2019;2047487319832975. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30823865>

Rodu B and Plurphanswat N. Letter to JAHA: Re findings from the Bhatta-Glantz study invalid, London B, et al., Editors. 2019, University of Louisville Health Sciences Center: Louisville, Kentucky. Available from: <https://reason.com/wp-content/uploads/2019/07/Rodu-Plurphanswat-Letter-to-JAHA-AHA-071119.pdf>.

Orimoloye OA, Osei AD, Uddin SI, Mirbolouk M, and Blaha MJ. Electronic Cigarettes and Cardiovascular Risk: Science, Policy and the Cost of Certainty. *Eur Cardiol*, 2019; 14(3):159-60. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31933683>

Middlekauff HR. Cardiovascular impact of electronic-cigarette use. *Trends in Cardiovascular Medicine* 2019. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31072697>

MacDonald A and Middlekauff HR. Electronic cigarettes and cardiovascular health: what do we know so far? *Vasc Health Risk Manag*, 2019; 15:159-74. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31417268>

Lee WH, Ong SG, Zhou Y, Tian L, Bae HR, et al. Modeling Cardiovascular Risks of E-Cigarettes With Human-Induced Pluripotent Stem Cell-Derived Endothelial Cells. *Journal of the American College of Cardiology*, 2019; 73(21):2722-37. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31146818>

Kennedy CD, van Schalkwyk MCI, McKee M, and Pisinger C. The cardiovascular effects of electronic cigarettes: A systematic review of experimental studies. *Preventive Medicine*, 2019; 127:105770. Available from: <http://www.sciencedirect.com/science/article/pii/S0091743519302464>

Freedman JE and Trivedi CM. The Adverse Vascular Effects of E-Cigarettes: Smoke Without the Fire. *Journal of the American College of Cardiology*, 2019; 73(21):2738-9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31146819>

Darville A and Hahn EJ. E-cigarettes and Atherosclerotic Cardiovascular Disease: What Clinicians and Researchers Need to Know. *Curr Atheroscler Rep*, 2019; 21(5):15. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30877398>

D'Amaro D, Migliaro S, Borovac JA, Vergallo R, Galli M, et al. Electronic Cigarettes and Cardiovascular Risk: Caution Waiting for Evidence. *Eur Cardiol*, 2019; 14(3):151-8. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31933682>

Chaumont M, Tagliatti V, Channan EM, Colet JM, Bernard A, et al. Short halt in vaping modifies cardio-respiratory parameters and urine metabolome: a randomized trial. *American Journal of*

Physiology - Lung Cellular and Molecular Physiology, 2019. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/31721596>

Buchanan ND, Grimmer JA, Tanwar V, Schwieterman N, Mohler PJ, et al. Cardiovascular risk of electronic cigarettes: a review of preclinical and clinical studies. *Cardiovasc Res*, 2019. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31696222>

Bhatnagar A. Editorial Commentary: The cardiovascular cost of vaping. *Trends Cardiovasc Med*, 2019. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31208811>

Banks E, Joshy G, Korda RJ, Stavreski B, Soga K, et al. Tobacco smoking and risk of 36 cardiovascular disease subtypes: fatal and non-fatal outcomes in a large prospective Australian study. *BMC Medicine*, 2019; 17(1):128. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31266500>

Babic M, Schuchardt M, Tolle M, and van der Giet M. In times of tobacco-free nicotine consumption: The influence of nicotine on vascular calcification. *Eur J Clin Invest*, 2019:e13077. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30721530>

Zhang G, Wang Z, Zhang K, Hou R, Xing C, et al. Safety Assessment of Electronic Cigarettes and Their Relationship with Cardiovascular Disease. *International Journal of Environmental Research and Public Health*, 2018; 15(1). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29304018>

Lippi G and Sanchis-Gomar F. Is it time to be concerned about the effects of e-cigarettes on cardiovascular health? *Expert Rev Cardiovasc Ther*, 2018; 16(8):547-9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29975562>

Fetterman JL, Weisbrod RM, Feng B, Bastin R, Tuttle ST, et al. Flavorings in Tobacco Products Induce Endothelial Cell Dysfunction. *Arteriosclerosis, Thrombosis, and Vascular Biology*, 2018. Available from: <http://atvb.ahajournals.org/content/atvbaha/early/2018/06/13/ATVBAHA.118.311156.full.pdf>

Fetterman JL and Hamburg NM. A cautionary note on electronic cigarettes and vascular health. *Vasc Med*, 2018:1358863X18780336. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29985110>

Chaumont M, de Becker B, Zaher W, Culie A, Deprez G, et al. Differential effects of e-cigarette on microvascular endothelial function, arterial stiffness and oxidative stress: A randomized crossover trial. *Scientific Reports*, 2018; 8(1):10378. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29991814>

Bold KW, Krishnan-Sarin S, and Stoney CM. E-cigarette use as a potential cardiovascular disease risk behavior. *Am Psychol*, 2018; 73(8):955-67. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30394775>

Ahmed N, Kalininskiy A, Gandhi H, and Shin JJ. Spontaneous coronary artery dissection in a postpartum e-cigarette smoker. *BMJ Case Rep*, 2018; 2018. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29866694>

Ween MP, Whittall JJ, Hamon R, Reynolds PN, and Hodge SJ. Phagocytosis and Inflammation: Exploring the effects of the components of E-cigarette vapor on macrophages. *Physiol Rep*, 2017; 5(16). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28867672>

Sanchis-Gomar F, Lippi G, and Perez-Quilis C. Increased Cardiovascular Risk Associated With E-Cigarette Use. *JAMA Cardiol*, 2017. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28593298>

Qasim H, Karim ZA, Rivera JO, Khasawneh FT, and Alshbool FZ. Impact of Electronic Cigarettes on the Cardiovascular System. *J Am Heart Assoc*, 2017; 6(9). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28855171>

Moheimani RS, Bhetraratana M, Yin F, Peters KM, Gornbein J, et al. Increased Cardiac Sympathetic Activity and Oxidative Stress in Habitual Electronic Cigarette Users: Implications for Cardiovascular Risk. *JAMA Cardiol*, 2017. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28146259>

Middlekauff HR and Araujo JA. Increased Cardiovascular Risk Associated With E-Cigarette Use-Reply. *JAMA Cardiol*, 2017. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28593271>

Kuehn BM. Emerging Data Show E-Cigarettes May Pose Heart Risk. *Circulation*, 2017; 136(2):232-3. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28696269>

Kruse GR, Kalkhoran S, and Rigotti NA. Use of Electronic Cigarettes Among U.S. Adults With Medical Comorbidities. *American Journal of Preventive Medicine*, 2017. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28108191>

Hyland A, Ambrose BK, Conway KP, Borek N, Lambert E, et al. Design and methods of the Population Assessment of Tobacco and Health (PATH) Study. *Tobacco Control*, 2017; 26(4):371-8. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/27507901>

Glantz S. E-cigarettes clobber platelets as much as cigarettes. Center for Tobacco Control Research and Education (UCSF) 2017. Available from: <https://tobacco.ucsf.edu/e-cigarettes-clobber-platelets-much-cigarettes>.

Dalkou S and Clair C. [Smoking, vaping and cardiovascular risk : an update]. *Rev Med Suisse*, 2017; 13(566):1186-90. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28640563>

Bhatnagar A. Are Electronic Cigarette Users at Increased Risk for Cardiovascular Disease? *JAMA Cardiol*, 2017. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28146233>

Benowitz NL and Fraiman JB. Cardiovascular effects of electronic cigarettes. *Nature Reviews Cardiology*, 2017; 14(8):447–56. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28332500>

Tindle HA and Freiberg MS. Editorial Commentary: Nicotine in electronic cigarettes: Cardiovascular harm reduction, not elimination. *Trends Cardiovasc Med*, 2016. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27155811>

Nelluri B, Murphy K, Mookadam F, and Mookadam M. The current literature regarding the cardiovascular effects of electronic cigarettes. *Future Cardiology*, 2016; 12(2):167–79. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/26916427>

Nelluri B, Murphy K, Mookadam F, and Mookadam M. A review of the current literature regarding the cardiovascular effects of electronic cigarettes. *Future Cardiology*, 2016; 12(2):167–79. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26916427>

Hom S, Chen L, Wang T, Ghebrehiwet B, Yin W, et al. Platelet activation, adhesion, inflammation, and aggregation potential are altered in the presence of electronic cigarette extracts of variable nicotine concentrations. *Platelets*, 2016; 27(7):694-702. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/27096416>

Heiss C. Electronic cigarettes increase EPCs. *Atherosclerosis*, 2016. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/27814909>

Bhatnagar A. Cardiovascular Perspective of the Promises and Perils of E-Cigarettes. *Circ Res*, 2016; 118(12):1872–5. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27283531>

Antoniewicz L, Bosson JA, Kuhl J, Abdel-Halim SM, Kiessling A, et al. Electronic cigarettes increase endothelial progenitor cells in the blood of healthy volunteers. *Atherosclerosis*, 2016. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27693003>

Anderson C, Majeste A, Hanus J, and Wang S. E-Cigarette Aerosol Exposure Induces Reactive Oxygen Species, DNA Damage, and Cell Death in Vascular Endothelial Cells. *Toxicol Sci*, 2016. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27613717>

Riley HE, Berry-Bibee E, England LJ, Jamieson DJ, Marchbanks PA, et al. Hormonal Contraception among Electronic Cigarette Users and Cardiovascular Risk: A Systematic Review. *Contraception*, 2015. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26546021>

Nelluri BK, Murphy K, and Mookadam F. Electronic cigarettes and cardiovascular risk: hype or up in smoke? *Future Cardiology*, 2015; 11(3):271–3. Available from:

<http://www.ncbi.nlm.nih.gov/pubmed/26021631>

Jerry JM, Collins GB, and Stroom D. E-cigarettes: Safe to recommend to patients? *Cleve Clin J Med*, 2015; 82(8):521–6. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26270431>

18.6.3.1 Heart attack and coronary heart disease

Fernandez MIC, Co MF, Rafael JBM, Mag-Usara RC, Ediza V, et al. Acute myocardial infarction with e-cigarette or vaping-use associated lung injury in a young Filipino vape user. *Respirol Case Rep*, 2024; 12(4):e01353. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38633225>

Farfan Bajana MJ, Zevallos JC, Cherrez-Ojeda I, Alvarado G, Green T, et al. Association between the use of electronic cigarettes and myocardial infarction in U.S. adults. *BMC Public Health*, 2024; 24(1):2110. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39103826>

Alzahrani T. Correction: Electronic Cigarette Use and Myocardial Infarction. *Cureus*, 2024; 16(3):c164. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38482538>

Ashraf MT, Shaikh A, Khan MKS, Uddin N, Kashif MAB, et al. Association between e-cigarette use and myocardial infarction: a systematic review and meta-analysis. *Egypt Heart J*, 2023; 75(1):97.

Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38032522>

Alzahrani T. Electronic Cigarette Use and Myocardial Infarction. *Cureus*, 2023; 15(11):e48402. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38073929>

Sharma A, Gupta I, Venkatesh U, Singh AK, Golamari R, et al. E-cigarettes and myocardial infarction: A systematic review and meta-analysis. *International Journal of Cardiology*, 2022. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36087629>

Critchler CR and Siegel M. Re-examining the Association Between E-Cigarette Use and Myocardial Infarction: A Cautionary Tale. *American Journal of Preventive Medicine*, 2021. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34304940>

Vajdi B and Tuktamyshov R. Electronic cigarettes - myocardial infarction, hemodynamic compromise during pregnancy, and systolic and diastolic dysfunction: Minireview. *World J Cardiol*, 2020; 12(10):475-83. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33173566>

Rodu B and Plurphanswat N. A re-analysis of e-cigarette use and heart attacks in PATH wave 1 data. *Addiction*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32794213>

Retraction to: Electronic Cigarette Use and Myocardial Infarction Among Adults in the US Population Assessment of Tobacco and Health. *J Am Heart Assoc*, 2020; 9(4):e014519. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32066313>

Lippi G and Favaloro EJ. An Update on Biological and Clinical Associations between E-Cigarettes and Myocardial Infarction. *Semin Thromb Hemost*, 2019. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31877568>

Farsalinos KE, Polosa R, Cibella F, and Niaura R. Is e-cigarette use associated with coronary heart disease and myocardial infarction? Insights from the 2016 and 2017 National Health Interview Surveys. *Therapeutic Advances in Chronic Disease*, 2019; 10:2040622319877741. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31632622>

Farsalinos K and Niaura R. E-cigarette Use and Myocardial Infarction: Association Versus Causal Inference. *American Journal of Preventive Medicine*, 2019; 56(4):626-7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30898223>

Bover Manderski MT, Singh B, and Delnevo CD. E-Cigarette Use and Myocardial Infarction: Importance of a Sound Evidence Base in the E-Cigarette Risks-Benefits Debate. *American Journal of Preventive Medicine*, 2019; 57(4):568-9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31542133>

Bhatta DN and Glantz SA. Electronic Cigarette Use and Myocardial Infarction Among Adults in the US Population Assessment of Tobacco and Health. *J Am Heart Assoc*, 2019; 8(12):e012317. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31165662>

Alzahrani T and Glantz SA. Adding Data From 2015 Strengthens the Association Between E-Cigarette Use and Myocardial Infarction. *American Journal of Preventive Medicine*, 2019; 57(4):569-71. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31542134>

Alzahrani T and Glantz SA. The Association Between E-cigarette Use and Myocardial Infarction Is What One Would Expect Based on the Biological and Clinical Evidence. *American Journal of Preventive Medicine*, 2019; 56(4):627. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30898224>

Middlekauff HR and Gornbein J. Association of Electronic Cigarette Use With Myocardial Infarction: Persistent Uncertainty. *American Journal of Preventive Medicine*, 2018. Available from: [https://www.ajpmonline.org/article/S0749-3797\(18\)32006-3/fulltext](https://www.ajpmonline.org/article/S0749-3797(18)32006-3/fulltext)

Alzahrani T, Pena I, Temesgen N, and Glantz SA. Association Between Electronic Cigarette Use and Myocardial Infarction. *American Journal of Preventive Medicine*, 2018; 55(4):455–61. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30166079>

18.6.3.2 Stroke

Shi J, Xiong L, Guo J, and Yang Y. The association between combustible/electronic cigarette use and stroke based on national health and nutrition examination survey. *BMC Public Health*, 2023; 23(1):697. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37059973>

Elser H, Vijayaraghavan M, and Kasner SE. E-Cigarettes and Stroke Risk-Present Uncertainties and Future Directions. *JAMA Neurol*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37428484>

Awad K, Mohammed M, Martin SS, and Banach M. Association between electronic nicotine delivery systems use and risk of stroke: a meta-analysis of 1,024,401 participants. *Arch Med Sci*, 2023; 19(5):1538-40. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37732043>

Zhao K, Li J, Zhou P, Xu L, and Yang M. Is electronic cigarette use a risk factor for stroke? A systematic review and meta-analysis. *Tobacco Induced Diseases*, 2022; 20:101. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36447455>

Sifat AE, Archie SR, Nozohouri S, Villalba H, Zhang Y, et al. Short-term exposure to JUUL electronic cigarettes can worsen ischemic stroke outcome. *Fluids Barriers CNS*, 2022; 19(1):74. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36085043>

Patel U, Patel N, Khurana M, Parulekar A, Patel A, et al. Effect Comparison of E-Cigarette and Traditional Smoking and Association with Stroke-A Cross-Sectional Study of NHANES. *Neurol Int*, 2022; 14(2):441-52. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35736618>

Klein AP, Yarbrough K, and Cole JW. Stroke, Smoking and Vaping: The No-Good, the Bad and the Ugly. *Ann Public Health Res*, 2021; 8(1). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34322688>

Bricknell RAT, Ducaud C, Figueroa A, Schwarzman LS, Rodriguez P, et al. An association between electronic nicotine delivery systems use and a history of stroke using the 2016 behavioral risk factor surveillance system. *Medicine (Baltimore)*, 2021; 100(36):e27180. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34516517>

Parekh T, Pemmasani S, and Desai R. Risk of stroke with e-cigarette and combustible cigarette use in young adults. *American Journal of Preventive Medicine*, 2020; 58(3):446-52. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31924460>

Farsalinos K, Abrams D, and Niaura R. Can the Association Between Electronic-Cigarette Use and Stroke Be Interpreted as Risk of Stroke? *American Journal of Preventive Medicine*, 2020; 58(6):895-6. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32444005>

Sifat AE, Vaidya B, Kaisar MA, Cucullo L, and Abbruscato TJ. Nicotine & electronic cigarette (E-Cig) exposure decreases brain glucose utilization in ischemic stroke. *J Neurochem*, 2018. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30062776>

Kaisar MA, Villalba H, Prasad S, Liles T, Sifat AE, et al. Offsetting the impact of smoking and e-cigarette vaping on the cerebrovascular system and stroke injury: Is Metformin a viable countermeasure? *Redox Biol*, 2017; 13:353-62. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28646795>

18.6.3.3 Other cardiovascular conditions

Behrooz L, Xie W, Goghari A, Robertson R, Bhatnagar A, et al. Electronic cigarette use and chest pain in US adults: Evidence from the PATH study. *Tobacco Induced Diseases*, 2024; 22. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38250630>

Shi H, Leventhal AM, Wen Q, Ossip DJ, and Li D. Sex differences in the association of e-cigarette and cigarette use and dual use with self-reported hypertension incidence in US adults. *Nicotine & Tobacco Research*, 2023; 25(3):478-85. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35863748>

Liu CW, Le HHT, Denaro Iii P, Dai Z, Shao NY, et al. E-cigarettes induce dysregulation of autophagy leading to endothelial dysfunction in pulmonary arterial hypertension. *Stem Cells*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36640125>

Kelesidis T, Sharma M, Sharma E, Ruedisueli I, Tran E, et al. Chronic Electronic Cigarette Use and Atherosclerosis Risk in Young People: A Cross-Sectional Study. *Arterioscler Thromb Vasc Biol*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37409529>

Cook S, Hirschtick JL, Barnes G, Arenberg D, Bondarenko I, et al. Time-varying association between cigarette and ENDS use on incident hypertension among US adults: a prospective longitudinal study. *BMJ Open*, 2023; 13(4):e062297. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37085311>

Kim SY, Jeong SH, Joo HJ, Park M, Park EC, et al. High prevalence of hypertension among smokers of conventional and e-cigarette: Using the nationally representative community dwelling survey. *Front Public Health*, 2022; 10:919585. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36324451>

Falk GE, Okut H, Vindhya MR, and Ablah E. Hypertension and cardiovascular diseases among electronic and combustible cigarette users. *Kansas Journal of Medicine*, 2022; 15:226-30. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35899059>

Damay VA, Setiawan, Lesmana R, Akbar MR, Lukito AA, et al. Electronic Cigarette and Atherosclerosis: A Comprehensive Literature Review of Latest Evidences. *Int J Vasc Med*, 2022; 2022:4136811. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36093338>

Sahota A, Naidu S, Jacobi A, Giannarelli C, Woodward M, et al. Atherosclerosis inflammation and burden in young adult smokers and vapers measured by PET/MR. *Atherosclerosis*, 2021. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33896592>

Miller CR, Shi H, Li D, and Goniewicz ML. Cross-Sectional Associations of Smoking and E-cigarette Use with Self-Reported Diagnosed Hypertension: Findings from Wave 3 of the Population Assessment of Tobacco and Health Study. *Toxics*, 2021; 9(3). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33803457>

Li J, Huynh L, Cornwell WD, Tang MS, Simborio H, et al. Electronic Cigarettes Induce Mitochondrial DNA Damage and Trigger TLR 9 (Toll-Like Receptor 9)-Mediated Atherosclerosis. *Arterioscler Thromb Vasc Biol*, 2020:ATVBAHA120315556. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33380174>

Kelesidis T, Zhang Y, Tran E, Sosa G, and Middlekauff HR. Expression of Key Inflammatory Proteins Is Increased in Immune Cells From Tobacco Cigarette Smokers But Not Electronic Cigarette Vapers: Implications for Atherosclerosis. *J Am Heart Assoc*, 2020:e019324. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33356378>

Polosa R, Morjaria JB, Caponnetto P, Battaglia E, Russo C, et al. Blood Pressure Control in Smokers with Arterial Hypertension Who Switched to Electronic Cigarettes. *International Journal of Environmental Research and Public Health*, 2016; 13(11). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/27845734>

18.6.3.4 Short-term effects of e-cigarettes on the cardiovascular system

Qazi SU, Ansari MH, Ghazanfar S, Ghazanfar SS, and Farooq M. Comparison of acute effects of e-cigarettes with and without nicotine and tobacco cigarettes on hemodynamic and endothelial parameters: A systematic review and meta-analysis. *High Blood Pressure & Cardiovascular Prevention*, 2024; 31(3):225-37. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38668958>

Nguyen R, Ruedisueli I, Lakhani K, Ma J, and Middlekauff HR. Acute Cardiovascular Effects of 4(th) Generation Electronic Cigarettes and Combusted Cigarettes: Implications for Harm Reduction. *J Appl Physiol (1985)*, 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38205548>

Tran Duc M, Nguyen Y, Nguyen Hung D, Truong Hoai L, and Nguyen Xuan P. Acute Pericarditis After Use of Electronic Cigarettes: A Case Report. *Cureus*, 2023; 15(12):e49810. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38164324>

Tattersall MC, Hughey CM, Piasecki TM, Korcarz CE, Hansen KM, et al. Cardiovascular and pulmonary responses to acute use of electronic nicotine delivery systems and combustible cigarettes in long-term users. *Chest*, 2023; 164(3):757-69. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37044158>

Mills A, Frazier J, Plants R, Burrage E, Coblentz T, et al. Effects of electronic cigarette E-liquid and device wattage on vascular function. *Toxicol Appl Pharmacol*, 2023; 474:116631. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37468077>

Lyytinen G, Brynedal A, Anesater E, Antoniewicz L, Blomberg A, et al. Electronic Cigarette Vaping with Nicotine Causes Increased Thrombogenicity and Impaired Microvascular Function in Healthy Volunteers: A Randomised Clinical Trial. *Cardiovasc Toxicol*, 2023; 23(7-8):255-64. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37548804>

Daiber A, Kuntic M, Oelze M, Hahad O, and Munzel T. E-cigarette effects on vascular function in animals and humans. *Pflugers Arch*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37084087>

Ben Taleb Z, Dabroy D, Akins J, Nelson MD, Kalan ME, et al. Pod-based e-cigarettes versus combustible cigarettes: The impact on peripheral and cerebral vascular function and subjective experiences. *Tobacco Induced Diseases*, 2023; 21:71. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37252033>

Mills A, Dakhlallah D, Robinson M, Kirk A, Llavina S, et al. Short-term effects of electronic cigarettes on cerebrovascular function: A time course study. *Exp Physiol*, 2022; 107(8):994-1006. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35661445>

Meng XC, Guo XX, Peng ZY, Wang C, and Liu R. Acute Effects of Electronic Cigarettes on Vascular Endothelial Function: A Systematic Review and Meta-analysis of Randomized Controlled Trials. *European Journal of Preventive Cardiology*, 2022. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36316290>

Dimitriadis K, Narkiewicz K, Leontsinis I, Konstantinidis D, Mihas C, et al. Acute Effects of Electronic and Tobacco Cigarette Smoking on Sympathetic Nerve Activity and Blood Pressure in Humans. *International Journal of Environmental Research and Public Health*, 2022; 19(6). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35328926>

Mueller SD, Britton GR, James GD, and Stewart Fahs P. Vaping Behaviour Patterns and Daily Blood Pressure and Heart Rate Variation: A Brief Report. *Ann Hum Biol*, 2021:1-13. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34842467>

Klonizakis M, Gumber A, McIntosh E, and Brose LS. Short-Term Cardiovascular Effects of E-Cigarettes in Adults Making a Stop-Smoking Attempt: A Randomized Controlled Trial. *Biology (Basel)*, 2021; 10(11). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34827200>

Gonzalez JE and Cooke WH. Acute effects of electronic cigarettes on arterial pressure and peripheral sympathetic activity in young nonsmokers. *American Journal of Physiology Heart and Circulatory Physiology*, 2021; 320(1):H248-H55. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33164580>

Choi S, Lee K, and Park SM. Combined associations of changes in noncombustible nicotine or tobacco product and combustible cigarette use habits with subsequent short-term cardiovascular disease risk among South Korean men: A nationwide cohort study. *Circulation*, 2021; 144(19):1528-38. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34601948>

Chatterjee S, Caporale A, Tao JQ, Guo W, Johncola A, et al. Acute e-cig inhalation impacts vascular health: a study in smoking naive subjects. *American Journal of Physiology-Heart and Circulatory Physiology*, 2021; 320(1):H144-H58. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33216614>

Correction to: Combined Associations of Changes in Noncombustible Nicotine or Tobacco Product and Combustible Cigarette Use Habits With Subsequent Short-Term Cardiovascular Disease Risk Among South Korean Men: A Nationwide Cohort Study. *Circulation*, 2021; 144(19):e306. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34748397>

Wehrli FW, Caporale A, Langham MC, and Chatterjee S. New Insights From MRI and Cell Biology Into the Acute Vascular-Metabolic Implications of Electronic Cigarette Vaping. *Front Physiol*, 2020; 11:492. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32528311>

Shao XM and Fang ZT. Severe Acute Toxicity of Inhaled Nicotine and e-Cigarettes: Seizures and Cardiac Arrhythmia. *Chest*, 2020; 157(3):506-8. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32145810>

McClelland M, Sesoko C, and MacDonald DA. A Mixed Methods Pilot Study on the Short-Term Physiological Effects of Vaping and Attitudes Regarding Its Use and Health Effects in Samples of Young Adults. *Journal of Addictions Nursing*, 2020; 31(2):110-8. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32487937>

Martinez-Morata I, Sanchez TR, Shimbo D, and Navas-Acien A. Electronic Cigarette Use and Blood Pressure Endpoints: a Systematic Review. *Curr Hypertens Rep*, 2020; 23(1):2. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33230755>

Kourea K, Kostelli G, and Ikonomidis I. Mid-term effects of electronic cigarette use on vascular function and oxidative stress. *Cardiovasc Res*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32271877>

Ikonomidis I, Katogiannis K, Gavriella K, Kourea K, Kyriakou E, et al. Effects of electronic cigarette on platelet and vascular function after four months of use. *Food Chem Toxicol*, 2020:111389. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32343994>

Gonsalves CL, Zhu JW, and Kam AJ. Diagnosis and Acute Management of E-cigarette or Vaping Product Use- Associated Lung Injury (EVALI) in the Pediatric Population: A Systematic Review. *The Journal of pediatrics*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32961169>

Fрати G, Carnevale R, Nocella C, Peruzzi M, Marullo AGM, et al. Profiling the Acute Effects of Modified Risk Products: Evidence from the SUR-VAPES (Sapienza University of Rome-Vascular Assessment of

Proatherosclerotic Effects of Smoking) Cluster Study. *Curr Atheroscler Rep*, 2020; 22(2):8. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32034541>

Farsalinos KE. Acute vs. chronic effects of e-cigarettes on vascular function. *European Heart Journal*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32077923>

Demir V, Hidayet S, Turan Y, and Ede H. Acute effects of electronic cigarette smoking on ventricular repolarization in adults. *Afr Health Sci*, 2020; 20(4):1793-9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34394241>

Biondi-Zoccai G, Carnevale R, Vitali M, Tritapepe L, Martinelli O, et al. A randomized trial comparing the acute coronary, systemic, and environmental effects of electronic vaping cigarettes versus heat-not-burn cigarettes in smokers of combustible cigarettes undergoing invasive coronary assessment: rationale and design of the SUR-VAPES 3 trial. *Minerva Cardioangiol*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32492988>

Wolkart G, Kollau A, Stessel H, Russwurm M, Koesling D, et al. Effects of flavoring compounds used in electronic cigarette refill liquids on endothelial and vascular function. *PLoS One*, 2019; 14(9):e0222152. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31498828>

Sumartiningsih S, Lin HF, and Lin JC. Cigarette Smoking Blunts Exercise-Induced Heart Rate Response among Young Adult Male Smokers. *International Journal of Environmental Research and Public Health*, 2019; 16(6). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30901920>

Papaioannou TG, Aggeli C, and Tousoulis D. Does Nicotine-free Electronic Cigarette Vaping Affect Aortic Stiffness Independently of Heart Rate? *Radiology*, 2019:191966. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31638493>

Caporale A, Langham MC, Guo W, Johncola A, Chatterjee S, et al. Acute effects of electronic cigarette aerosol inhalation on vascular function detected at quantitative MRI. *Radiology*, 2019; 293(1):97-106. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31429679>

Biondi-Zoccai G, Sciarretta S, Bullen C, Nocella C, Violi F, et al. Acute effects of heat-not-burn, electronic vaping, and traditional tobacco combustion cigarettes: The Sapienza University of Rome-Vascular Assessment of Proatherosclerotic Effects of Smoking (SUR - VAPES) 2 randomized trial. *Journal of the American Heart Association*, 2019; 8(6):e010455. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30879375>

Ikonomidis I, Vlastos D, Kourea K, Kostelli G, Varoudi M, et al. Electronic Cigarette Smoking Increases Arterial Stiffness and Oxidative Stress to a Lesser Extent Than a Single Conventional Cigarette: An Acute and Chronic Study. *Circulation*, 2018; 137(3):303-6. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29335291>

Moheimani RS, Bhetraratana M, Peters KM, Yang BK, Yin F, et al. Sympathomimetic Effects of Acute E-Cigarette Use: Role of Nicotine and Non-Nicotine Constituents. *J Am Heart Assoc*, 2017; 6(9). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28931527>

Klonizakis M, Crank H, Gumber A, and Brose LS. Smokers making a quit attempt using e-cigarettes with or without nicotine or prescription nicotine replacement therapy: Impact on cardiovascular

function (ISME-NRT) - a study protocol. BMC Public Health, 2017; 17(1):293. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28376818>

Cooke WH, Pokhrel A, Dowling C, Fogt DL, and Rickards CA. Acute inhalation of vaporized nicotine increases arterial pressure in young non-smokers: a pilot study. Clin Auton Res, 2015. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26264837>

18.6.3.5 Cardiovascular effects of e-cigarette use compared to smoking

Ruedisueli I, Shi K, Lopez S, Gornbein J, and Middlekauff HR. Arrhythmogenic effects of acute electronic cigarette compared to tobacco cigarette smoking in people living with HIV. Physiol Rep, 2024; 12(14):e16158. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39044007>

Poudel R, Li S, Hong H, Zhao J, Srivastava S, et al. Catecholamine levels with use of electronic and combustible cigarettes. Tobacco Induced Diseases, 2024; 22. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39144677>

Nguyen R, Ruedisueli I, Lakhani K, Ma J, and Middlekauff HR. Acute Cardiovascular Effects of 4(th) Generation Electronic Cigarettes and Combusted Cigarettes: Implications for Harm Reduction. J Appl Physiol (1985), 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38205548>

Wolkart G, Kollau A, Russwurm M, Koesling D, Schrammel A, et al. Varied effects of tobacco smoke and e-cigarette vapor suggest that nicotine does not affect endothelium-dependent relaxation and nitric oxide signaling. Scientific Reports, 2023; 13(1):15833. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37739972>

Tattersall MC, Hughey CM, Piasecki TM, Korcarz CE, Hansen KM, et al. Cardiovascular and pulmonary responses to acute use of electronic nicotine delivery systems and combustible cigarettes in long-term users. Chest, 2023; 164(3):757-69. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37044158>

Shi J, Xiong L, Guo J, and Yang Y. The association between combustible/electronic cigarette use and stroke based on national health and nutrition examination survey. BMC Public Health, 2023; 23(1):697. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37059973>

Ruedisueli I, Lakhani K, Nguyen R, Gornbein J, and Middlekauff HR. Electronic cigarettes prolong ventricular repolarization in people who smoke tobacco cigarettes: Implications for harm reduction. Am J Physiol Heart Circ Physiol, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37057991>

La Rosa G, Vernooij R, Qureshi M, Polosa R, and O'Leary R. Clinical testing of the cardiovascular effects of e-cigarette substitution for smoking: a living systematic review. Intern Emerg Med, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36609804>

Klein J, Diaba-Nuhoho P, Giebe S, Brunssen C, and Morawietz H. Regulation of endothelial function by cigarette smoke and next-generation tobacco and nicotine products. Pflugers Arch, 2023; 475(7):835-44. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37285061>

Ikonomidis I, Katogiannis K, Kourea K, Kostelli G, Pavlidis G, et al. Differential effects of heat-not-burn, electronic, and conventional cigarettes on endothelial glycocalyx. *Eur Heart J Imaging Methods Pract*, 2023; 1(1):qyad008. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39044785>

Hauck AS, Buchwald I, Watz H, Trinkmann F, Soling C, et al. Impact of chewing bags, e-cigarettes, and combustible cigarettes on arterial stiffness and small airway function in healthy students. *Toxics*, 2023; 11(1). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36668804>

Han DD, Rao P, Qiu H, Navabzadeh M, Wang X, et al. Impairment of Endothelial Function by Cigarette Smoke and e-Cigarette Aerosol Requires RAGE. *Arterioscler Thromb Vasc Biol*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37795616>

Goebel I, Mohr T, Axt PN, Watz H, Trinkmann F, et al. Impact of heated tobacco products, e-cigarettes, and combustible cigarettes on small airways and arterial stiffness. *Toxics*, 2023; 11(9). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37755768>

Ben Taleb Z, Dabroy D, Akins J, Nelson MD, Kalan ME, et al. Pod-based e-cigarettes versus combustible cigarettes: The impact on peripheral and cerebral vascular function and subjective experiences. *Tobacco Induced Diseases*, 2023; 21:71. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37252033>

Su L, Zhao M, Ma F, An Z, Yue Q, et al. A comparative assessment of e-cigarette aerosol extracts and tobacco cigarette smoke extracts on in vitro endothelial cell inflammation response. *Hum Exp Toxicol*, 2022; 41:9603271221088996. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35382644>

Okafor CN, Okafor N, Kaliszewski C, and Wang L. Association between electronic cigarette and combustible cigarette use with cardiometabolic risk biomarkers among U.S. adults. *Annals of Epidemiology*, 2022. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35196553>

Mahoney MC, Rivard C, Kimmel HL, Hammad HT, Sharma E, et al. Cardiovascular outcomes among combustible-tobacco and electronic nicotine delivery system (ENDS) users in waves 1 through 5 of the Population Assessment of Tobacco and Health (PATH) Study, 2013-2019. *International Journal of Environmental Research and Public Health*, 2022; 19(7). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35409819>

Klonizakis M, Gumber A, McIntosh E, and Brose LS. Medium- and longer-term cardiovascular effects of e-cigarettes in adults making a stop-smoking attempt: a randomized controlled trial. *BMC Medicine*, 2022; 20(1):276. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35971150>

Dimitriadis K, Narkiewicz K, Leontsinis I, Konstantinidis D, Mihas C, et al. Acute Effects of Electronic and Tobacco Cigarette Smoking on Sympathetic Nerve Activity and Blood Pressure in Humans. *International Journal of Environmental Research and Public Health*, 2022; 19(6). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35328926>

Conklin DJ. How Irritating! Electronic Cigarettes Not "95% Safer" Than Combustible Cigarettes: Recent Mechanistic Insights Into Endothelial Dysfunction. *Arterioscler Thromb Vasc Biol*, 2022; 42(11):1351-4. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36288291>

Caruso M, Emma R, Distefano A, Rust S, Poulas K, et al. Comparative assessment of electronic nicotine delivery systems aerosol and cigarette smoke on endothelial cell migration: The Replica Project. *Drug Test Anal*, 2022. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35877466>

O'Leary R, Qureshi MA, La Rosa GRM, Vernooij RWM, Odimegwu DC, et al. Respiratory and Cardiovascular Health Effects of e-Cigarette Substitution: Protocol for Two Living Systematic Reviews. *JMIR Res Protoc*, 2021; 10(5):e29084. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34042601>

Miller CR, Shi H, Li D, and Goniewicz ML. Cross-Sectional Associations of Smoking and E-cigarette Use with Self-Reported Diagnosed Hypertension: Findings from Wave 3 of the Population Assessment of Tobacco and Health Study. *Toxics*, 2021; 9(3). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33803457>

Metzen D, M'Pembale R, Zako S, Mourikis P, Helten C, et al. Platelet reactivity is higher in e-cigarette vaping as compared to traditional smoking. *International Journal of Cardiology*, 2021; 343:146-8. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34506824>

Makwana O, Smith GA, Flockton HE, Watters GP, Lowe F, et al. Impact of cigarette versus electronic cigarette aerosol conditioned media on aortic endothelial cells in a microfluidic cardiovascular model. *Scientific Reports*, 2021; 11(1):4747. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33637800>

Klonizakis M, Gumber A, McIntosh E, and Brose LS. Short-Term Cardiovascular Effects of E-Cigarettes in Adults Making a Stop-Smoking Attempt: A Randomized Controlled Trial. *Biology (Basel)*, 2021; 10(11). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34827200>

Kadry H, Noorani B, Bickel U, Abbruscato TJ, and Cucullo L. Comparative assessment of in vitro BBB tight junction integrity following exposure to cigarette smoke and e-cigarette vapor: a quantitative evaluation of the protective effects of metformin using small-molecular-weight paracellular markers. *Fluids Barriers CNS*, 2021; 18(1):28. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34158083>

El-Mahdy MA, Mahgoup EM, Ewees MG, Eid MS, Abdelghany TM, et al. Long-term electronic cigarette exposure induces cardiovascular dysfunction similar to tobacco cigarettes: role of nicotine and exposure duration. *American Journal of Physiology Heart and Circulatory Physiology*, 2021; 320(5):H2112-H219. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33606584>

Choi S, Lee K, and Park SM. Combined associations of changes in noncombustible nicotine or tobacco product and combustible cigarette use habits with subsequent short-term cardiovascular disease risk among South Korean men: A nationwide cohort study. *Circulation*, 2021; 144(19):1528-38. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34601948>

Raja J, Khouzam A, Khouzam N, and Khouzam RN. Smoke and Heart Should Stay Apart: A Look at E Cigarettes and Other Alternatives to Conventional Cigarettes, and Their Impact on Cardiovascular Health. *Curr Probl Cardiol*, 2020:100640. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32622581>

Parekh T, Pemmasani S, and Desai R. Risk of stroke with e-cigarette and combustible cigarette use in young adults. *American Journal of Preventive Medicine*, 2020; 58(3):446-52. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31924460>

Oh SS, Jang JE, Lee DW, Park EC, and Jang SI. Cigarette type or smoking history: Which has a greater impact on the metabolic syndrome and its components? *Scientific Reports*, 2020; 10(1):10467. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32591636>

Nayeri A and Middlekauff H. Vaping Instead of Cigarette Smoking: A Panacea or Just Another form of Cardiovascular Risk? *Can J Cardiol*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33338608>

Lombardi M, Nunes JP, and Carbone S. Cardiovascular effects of heat-not-burn and electronic-vaping-cigarettes in smokers. *Minerva Cardioangiologica*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32996307>

Kelesidis T, Zhang Y, Tran E, Sosa G, and Middlekauff HR. Expression of Key Inflammatory Proteins Is Increased in Immune Cells From Tobacco Cigarette Smokers But Not Electronic Cigarette Vapers: Implications for Atherosclerosis. *J Am Heart Assoc*, 2020:e019324. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33356378>

Ip M, Diamantakos E, Haptonstall K, Choroomi Y, Moheimani RS, et al. Tobacco and Electronic Cigarettes Adversely Impact ECG Indices of Ventricular Repolarization: Implication for Sudden Death Risk. *Am J Physiol Heart Circ Physiol*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32196360>

Haptonstall KP, Choroomi Y, Moheimani R, Nguyen K, Tran E, et al. Differential effects of tobacco cigarettes and electronic cigarettes on endothelial function in healthy young people. *Am J Physiol Heart Circ Physiol*, 2020; 319(3):H547-H556. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32734819>

Goniewicz ML, Miller CR, Sutanto E, and Li D. How effective are electronic cigarettes for reducing respiratory and cardiovascular risk in smokers? A systematic review. *Harm Reduct J*, 2020; 17(1):91. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33228671>

George J, Hussain M, Donnan PT, Lang CC, and Khan F. Reply: Cardiovascular Benefits of Switching From Tobacco to Electronic Cigarettes. *Journal of the American College of Cardiology*, 2020; 75(13):1613-4. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32241381>

Darabseh MZ, Selfe J, Morse CI, and Degens H. Is vaping better than smoking for cardiorespiratory and muscle function? *Multidiscip Respir Med*, 2020; 15(1):674. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32670575>

Biondi-Zoccai G, Sciarretta S, Carnevale R, Peruzzi M, and Frati G. Cardiovascular benefits of switching from tobacco to electronic cigarettes. *Journal of the American College of Cardiology*, 2020; 75(13):1613. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32241380>

Benowitz NL, St Helen G, Nardone N, Addo N, Zhang JJ, et al. Twenty-four-hour cardiovascular effects of electronic cigarettes compared with cigarette smoking in dual users. *Journal of the*

American Heart Association, 2020; 9(23):e017317. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/33208019>

Arastoo S, Haptonstall KP, Choroomi Y, Moheimani RS, Nguyen KH, et al. Acute and Chronic Sympathomimetic Effects of E-Cigarette and Tobacco Cigarette Smoking: Role of Nicotine and Non-Nicotine Constituents. *Am J Physiol Heart Circ Physiol*, 2020. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/32559135>

Hawkes N. Study records improved blood flow within a month of replacing cigarettes with vaping. *British Medical Journal*, 2019; 367:l6548. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/31740439>

George J, Hussain M, Vadiveloo T, Ireland S, Hopkinson P, et al. Cardiovascular effects of switching from tobacco cigarettes to electronic cigarettes. *Journal of the American College of Cardiology*, 2019; 74(25):3112-20. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31740017>

Biondi-Zoccai G, Sciarretta S, Bullen C, Nocella C, Violi F, et al. Acute effects of heat-not-burn, electronic vaping, and traditional tobacco combustion cigarettes: The Sapienza University of Rome-Vascular Assessment of Proatherosclerotic Effects of Smoking (SUR - VAPES) 2 randomized trial. *Journal of the American Heart Association*, 2019; 8(6):e010455. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/30879375>

Badea M, Gaman L, Delia C, Ilea A, Leasu F, et al. Trends of Lipophilic, Antioxidant and Hematological Parameters Associated with Conventional and Electronic Smoking Habits in Middle-Age Romanians. *J Clin Med*, 2019; 8(5). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31083602>

Nocella C, Biondi-Zoccai G, Sciarretta S, Peruzzi M, Pagano F, et al. Impact of Tobacco Versus Electronic Cigarette Smoking on Platelet Function. *Am J Cardiol*, 2018. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/30170691>

Kaisar MA, Sivandzade F, Bhalerao A, and Cucullo L. Conventional and electronic cigarettes dysregulate the expression of iron transporters and detoxifying enzymes at the brain vascular endothelium: In vivo evidence of a gender-specific cellular response to chronic cigarette smoke exposure. *Neurosci Lett*, 2018; 682:1-9. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/29879439>

Ikonomidis I, Vlastos D, Kourea K, Kostelli G, Varoudi M, et al. Electronic Cigarette Smoking Increases Arterial Stiffness and Oxidative Stress to a Lesser Extent Than a Single Conventional Cigarette: An Acute and Chronic Study. *Circulation*, 2018; 137(3):303-6. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/29335291>

Franzen KF, Willig J, Cayo Talavera S, Meusel M, Sayk F, et al. E-cigarettes and cigarettes worsen peripheral and central hemodynamics as well as arterial stiffness: A randomized, double-blinded pilot study. *Vascular Medicine*, 2018; 0(0):1358863X18779694. Available from:

<http://journals.sagepub.com/doi/abs/10.1177/1358863X18779694>

Aveyard P, Arnott D, and Johnson KC. Should we recommend e-cigarettes to help smokers quit? British Medical Journal, 2018; 361. Available from: <https://www.bmj.com/content/bmj/361/bmj.k1759.full.pdf>

Klonizakis M, Crank H, Gumber A, and Brose LS. Smokers making a quit attempt using e-cigarettes with or without nicotine or prescription nicotine replacement therapy: Impact on cardiovascular function (ISME-NRT) - a study protocol. BMC Public Health, 2017; 17(1):293. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28376818>

Glantz S. More evidence that e-cigarettes are as bad as cigarettes for blood vessels, this time on skin. Center for Tobacco Control Research and Education (UCSF) 2017. Available from: <https://tobacco.ucsf.edu/more-evidence-e-cigarettes-are-bad-cigarettes-blood-vessels-time-skin>.

D'Ruiz CD, O'Connell G, Graff DW, and Yan XS. Measurement of cardiovascular and pulmonary function endpoints and other physiological effects following partial or complete substitution of cigarettes with electronic cigarettes in adult smokers. Regulatory Toxicology and Pharmacology, 2017; 87:36-53. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28476553>

Boas Z, Gupta P, Moheimani RS, Bhetraratana M, Yin F, et al. Activation of the "Spleno-cardiac Axis" by electronic and tobacco cigarettes in otherwise healthy young adults. Physiol Rep, 2017; 5(17). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28899908>

Antherieu S, Garat A, Beauval N, Soyez M, Allorge D, et al. Comparison of cellular and transcriptomic effects between electronic cigarette vapor and cigarette smoke in human bronchial epithelial cells. Toxicol In Vitro, 2017. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28065790>

Polosa R, Morjaria JB, Caponnetto P, Battaglia E, Russo C, et al. Blood Pressure Control in Smokers with Arterial Hypertension Who Switched to Electronic Cigarettes. International Journal of Environmental Research and Public Health, 2016; 13(11). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/27845734>

Glantz S. Important new study shows immediate effects of e-cigs on the cardiovascular system as big as smoking a cigarette. Center for Tobacco Control Research and Education (UCSF) U.S 2016. Available from: <https://tobacco.ucsf.edu/important-new-study-shows-immediate-effects-e-cigs-cardiovascular-system-big-smoking-cigarette>.

Morris PB, Ference BA, Jahangir E, Feldman DN, Ryan JJ, et al. Cardiovascular Effects of Exposure to Cigarette Smoke and Electronic Cigarettes: Clinical Perspectives From the Prevention of Cardiovascular Disease Section Leadership Council and Early Career Councils of the American College of Cardiology. Journal of the American College of Cardiology, 2015; 66(12):1378–91. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26383726>

18.6.3.6 Dual use of e-cigarettes and conventional cigarettes

Glantz SA, Nguyen N, and Oliveira da Silva AL. Population-based disease odds for e-cigarettes and dual use versus cigarettes. NEJM Evidence, 2024; 3(3):EVIDoA2300229. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38411454>

Chen C, Huo C, Matthey-Mora PP, Bidulescu A, and Parker MA. Assessing the association between e-cigarette use and cardiovascular disease: A meta-analysis of exclusive and dual use with combustible cigarettes. *Addictive Behaviors*, 2024; 157:108086. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/38917766>

Shi J, Xiong L, Guo J, and Yang Y. The association between combustible/electronic cigarette use and stroke based on national health and nutrition examination survey. *BMC Public Health*, 2023; 23(1):697. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37059973>

Qeadan F, Nicolson A, Barbeau WA, Azagba S, and English K. The association between dual use of electronic nicotine products and illicit drugs with adverse cardiovascular and respiratory outcomes in a longitudinal analysis using the Population Assessment of Tobacco and Health (PATH) survey. *Drug Alcohol Depend Rep*, 2023; 7:100166. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/37228861>

Krysinski A, Russo C, Campagna D, Di Pino A, John S, et al. A multicenter prospective randomized controlled trial investigating the effects of combustion-free nicotine alternatives on cardiovascular risk factors and metabolic parameters in individuals with type 2 diabetes who smoke: the DiaSmokeFree study protocol. *Intern Emerg Med*, 2023. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/37999870>

Hirschtick JL, Cook S, Patel A, Barnes GD, Arenberg D, et al. Longitudinal associations between exclusive and dual use of electronic nicotine delivery systems and cigarettes and self-reported incident diagnosed cardiovascular disease among adults. *Nicotine & Tobacco Research*, 2023; 25(3):386-94. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35907264>

Cai J and Bidulescu A. The association between e-cigarette use or dual use of e-cigarette and combustible cigarette and prediabetes, diabetes, or insulin resistance: Findings from the National Health and Nutrition Examination Survey (NHANES). *Drug and Alcohol Dependence*, 2023; 251:110948. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37666093>

Cai J and Bidulescu A. Associations between e-cigarette use or dual use of e-cigarette and combustible cigarette and metabolic syndrome: Results from the National Health and Nutrition Examination Survey (NHANES). *Annals of Epidemiology*, 2023. Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/37201667>

Mahoney MC, Rivard C, Kimmel HL, Hammad HT, Sharma E, et al. Cardiovascular outcomes among combustible-tobacco and electronic nicotine delivery system (ENDS) users in waves 1 through 5 of the Population Assessment of Tobacco and Health (PATH) Study, 2013-2019. *International Journal of Environmental Research and Public Health*, 2022; 19(7). Available from:

<https://www.ncbi.nlm.nih.gov/pubmed/35409819>

Falk GE, Okut H, Vindhyal MR, and Ablah E. Hypertension and cardiovascular diseases among electronic and combustible cigarette users. *Kansas Journal of Medicine*, 2022; 15:226-30. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35899059>

Choi S, Lee K, and Park SM. Combined associations of changes in noncombustible nicotine or tobacco product and combustible cigarette use habits with subsequent short-term cardiovascular disease risk

among South Korean men: A nationwide cohort study. *Circulation*, 2021; 144(19):1528-38. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/34601948>

Parekh T, Pemmasani S, and Desai R. Risk of stroke with e-cigarette and combustible cigarette use in young adults. *American Journal of Preventive Medicine*, 2020; 58(3):446-52. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31924460>

Lombardi M, Nunes JP, and Carbone S. Cardiovascular effects of heat-not-burn and electronic-vaping-cigarettes in smokers. *Minerva Cardioangiologica*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32996307>

Kim CY, Paek YJ, Seo HG, Cheong YS, Lee CM, et al. Dual use of electronic and conventional cigarettes is associated with higher cardiovascular risk factors in Korean men. *Scientific Reports*, 2020; 10(1):5612. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32221375>

Osei AD, Mirbolouk M, Orimoloye OA, Dzaye O, Uddin SMI, et al. The association between e-cigarette use and cardiovascular disease among never and current combustible cigarette smokers: BRFSS 2016 & 2017. *American Journal of Medicine*, 2019. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30853474>

Keith RJ, Fetterman JL, Orimoloye OA, Dardari Z, Lorkiewicz P, et al. Characterization of Volatile Organic Compound (VOC) metabolites in Cigarette smokers, Electronic Nicotine Device Users, Dual Users and Non- users of tobacco. *Nicotine & Tobacco Research*, 2019. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30759242>

Wang JB, Olgin JE, Nah G, Vittinghoff E, Cataldo JK, et al. Cigarette and e-cigarette dual use and risk of cardiopulmonary symptoms in the Health eHeart Study. *PLoS One*, 2018; 13(7):e0198681. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30044773>

18.6.3.7 Animal studies

Velayutham M, Mills A, Khramtsov VV, and Olfert IM. An electron paramagnetic resonance time-course study of oxidative stress in the plasma of electronic cigarette exposed rats. *Exp Physiol*, 2024; 109(9):1420-5. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39090831>

Pradhyumn H, Patel SH, Furonos-Alonso O, Zhao W, Bramlett HM, et al. Electronic Cigarette Vape Exposure Exacerbates Post-Ischemic Outcomes in Female but Not in Male Rats. *Stroke*, 2024; 55(3):735-46. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38323450>

Jin L, Richardson A, Lynch J, Lorkiewicz P, Srivastava S, et al. Formaldehyde and the Transient Receptor Potential Ankyrin-1 Contribute to Electronic Cigarette Aerosol-induced Endothelial Dysfunction in Mice. *Toxicol Sci*, 2024. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/39067042>

Dai Y, Yang W, Song H, He X, Guan R, et al. Long-term effects of chronic exposure to electronic cigarette aerosol on the cardiovascular and pulmonary system in mice: A comparative study to cigarette smoke. *Environment International*, 2024; 185:108521. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38508052>

Dai W, Shi J, Siddarth P, Carreno J, Kleinman MT, et al. Effects of Electronic Cigarette Vaping on Cardiac and Vascular Function, and Post-myocardial Infarction Remodeling in Rats. *Cardiovasc Toxicol*, 2024; 24(2):199-208. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38340234>

Xu A, Duan K, Yang W, Feng G, Wu Z, et al. The toxic effects of electronic cigarette aerosol and cigarette smoke on cardiovascular, gastrointestinal and renal systems in mice. *Scientific Reports*, 2023; 13(1):12366. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37524767>

Mancuso S, Bhalerao A, and Cucullo L. Use of Conventional Cigarette Smoking and E-Cigarette Vaping for Experimental Stroke Studies in Mice. *Methods Mol Biol*, 2023; 2616:441-51. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36715952>

Hussen E, Aakel N, Shaito AA, Al-Asmakh M, Abou-Saleh H, et al. Zebrafish (*Danio rerio*) as a Model for the Study of Developmental and Cardiovascular Toxicity of Electronic Cigarettes. *Int J Mol Sci*, 2023; 25(1). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38203365>

Daiber A, Kuntic M, Oelze M, Hahad O, and Munzel T. E-cigarette effects on vascular function in animals and humans. *Pflugers Arch*, 2023. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37084087>

Dai W, Shi J, Siddarth P, Zhao L, Carreno J, et al. Effects of Electronic Cigarette Exposure on Myocardial Infarction and No-Reflow, and Cardiac Function in a Rat Model. *J Cardiovasc Pharmacol Ther*, 2023; 28:10742484231155992. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36799436>

Chan AHP, Hu C, Chiang GCF, Ekweume C, and Huang NF. Chronic nicotine impairs the angiogenic capacity of human induced pluripotent stem cell-derived endothelial cells in a murine model of peripheral arterial disease. *JVS Vasc Sci*, 2023; 4:100115. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/37519333>

Alakhtar B, Guilbert C, Subramaniam N, Caruana V, Makhani K, et al. E-cigarette exposure causes early pro-atherogenic changes in an inducible murine model of atherosclerosis. *Front Toxicol*, 2023; 5:1244596. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/38164438>

Yu X, Zeng X, Xiao F, Chen R, Sinharoy P, et al. E-cigarette aerosol exacerbates cardiovascular oxidative stress in mice with an inactive aldehyde dehydrogenase 2 enzyme. *Redox Biol*, 2022; 54:102369. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35751982>

Neczypor EW, Saldana TA, Mears MJ, Aslaner DM, Escobar YH, et al. e-cigarette Aerosol Reduces Left Ventricular Function in Adolescent Mice. *Circulation*, 2022. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35184570>

Getiye Y, Peterson MR, Phillips BD, Carrillo D, Bisha B, et al. E-cigarette exposure with or without heating the e-liquid induces differential remodeling in the lungs and right heart of mice. *J Mol Cell Cardiol*, 2022; 168:83-95. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/35489388>

Carll AP, Arab C, Salatini R, Miles MD, Nystoriak MA, et al. E-cigarettes and their lone constituents induce cardiac arrhythmia and conduction defects in mice. *Nature Communications*, 2022; 13(1):6088. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/36284091>

Mayyas F, Aldawod H, Alzoubi KH, Khabour O, Shihadeh A, et al. Comparison of the cardiac effects of electronic cigarette aerosol exposure with waterpipe and combustible cigarette smoke exposure in rats. *Life Sci*, 2020; 251:117644. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32259604>

Lechasseur A, Huppe CA, Talbot M, Routhier J, Aubin S, et al. Exposure to nicotine-free and flavor-free e-cigarette vapors modifies the pulmonary response to tobacco cigarette smoke in female mice. *American Journal of Physiology - Lung Cellular and Molecular Physiology*, 2020. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/32845704>

Lavrynenko O, Titz B, Dijon S, Santos DD, Nury C, et al. Ceramide ratios are affected by cigarette smoke but not heat-not-burn or e-vapor aerosols across four independent mouse studies. *Life Sci*, 2020:118753. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33189821>

Hasan KM, Friedman TC, Parveen M, Espinoza-Derout J, Bautista F, et al. Electronic cigarettes cause alteration in cardiac structure and function in diet-induced obese mice. *PLoS One*, 2020; 15(10):e0239671. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/33002059>

Shi H, Fan X, Horton A, Haller ST, Kennedy DJ, et al. The Effect of Electronic-Cigarette Vaping on Cardiac Function and Angiogenesis in Mice. *Scientific Reports*, 2019; 9(1):4085. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30858470>

Qasim H, Karim ZA, Silva-Espinoza JC, Khasawneh FT, Rivera JO, et al. Short-Term E-Cigarette Exposure Increases the Risk of Thrombogenesis and Enhances Platelet Function in Mice. *J Am Heart Assoc*, 2018; 7(15). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30021806>

Lee HW, Park SH, Weng MW, Wang HT, Huang WC, et al. E-cigarette smoke damages DNA and reduces repair activity in mouse lung, heart, and bladder as well as in human lung and bladder cells. *Proceedings of the National Academy of Sciences of the United States of America*, 2018; 115(7):E1560-E9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29378943>

Olfert IM, DeVallance E, Hoskinson H, Branyan KW, Clayton S, et al. Chronic exposure to electronic cigarette (E-cig) results in impaired cardiovascular function in mice. *J Appl Physiol (1985)*, 2017:jap00713 2017. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29097631>

News:

18.6.3 E-cigarette use and cardiovascular disease

WHO, International Diabetes Federation, and University of Newcastle. Tobacco and Diabetes. 2023. Available from: <https://idf.org/news/quitting-smoking-cuts-your-risk-of-developing-type-2-diabetes-by-up-to-40/>.

Glantz S. We know a lot about how e-cigarettes cause disease. 2021. Available from: <https://profglantz.com/2021/06/01/we-know-a-lot-about-how-e-cigarettes-cause-disease/>.

Waghorn M. E-cig smokers breathe easy as scientists declare 'vaping is safe'. Daily Record. 2018. Available from: <https://www.dailyrecord.co.uk/news/health/e-cig-smokers-breathe-easy-11874155>.

Sandoiu A. E-cigarette flavors found to be toxic. Medical News Today. 2018. Available from: <https://www.medicalnewstoday.com/articles/320818.php>.

Rapaport L. E-cigarette flavorings may damage blood vessels and heart. Reuters. 2018. Available from: <https://uk.reuters.com/article/us-health-heart-vaping-flavors/e-cigarette-flavorings-may-damage-blood-vessels-and-heart-idUKKBN1K12WY>.

No authors listed. Flavored electronic cigarettes linked to possible cardiovascular disease Eurek Alert! 2018. Available from: https://eurekaalert.org/pub_releases/2018-06/bus0-fec061318.php.

No authors listed. Tobacco aside, e-cigarette flavorings may harm blood vessels. Science Daily. 2018. Available from: <https://www.sciencedaily.com/releases/2018/06/180614095240.htm>.

Neale T. E-Cigarettes: Plausible Heart Risks Flagged in New Review TCTMD. 2018. Available from: <https://www.tctmd.com/news/e-cigarettes-plausible-heart-risks-flagged-new-review>.

Moustafa S. Are e-cigarette flavorings toxic to the heart? Medical News Today. 2018. Available from: <https://www.medicalnewstoday.com/articles/322168.php>.

Whiteman H. E-cigarette flavorings may impair heart muscle function. Medical News Today. 2017. Available from: https://www.medicalnewstoday.com/articles/320108.php?utm_source=newsletter&utm_medium=email&utm_campaign=weekly.

Sandiou A. E-cigarettes: How safe are they for cardiovascular health? Medical News Today. 2017. Available from: http://www.medicalnewstoday.com/articles/318922.php?utm_source=newsletter&utm_medium=email&utm_campaign=daily.

Huang R. E-cigarettes increase risk of cardiac arrest The John-Hopkins Newsletter. 2017. Available from: <http://www.jhunewsletter.com/2017/10/05/e-cigarettes-increase-risk-of-cardiac-arrest/>.

18.6.3.1 Heart attack and coronary heart disease

Australia Institute of Health and Welfare. Heart, stroke and vascular disease: Australian facts. Canberra, Australia: AIHW, 2021. Available from: <https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/all-heart-stroke-and-vascular-disease/coronary-heart-disease>.

Shoot B. Biggest Vaping Study Ever Links E-Cigs With Heart Attacks and Depression. Fortune. 2019. Available from: <http://fortune.com/2019/03/08/tobacco-smoking-vaping-electronic-cigarettes-heart-attack-disease-depression/>.

No authors listed. Risk of heart attacks is double for daily e-cigarette users. Medical XPress. 2018. Available from: <http://medicalxpress.com/news/2018-08-heart-daily-e-cigarette-users.html>.

Glantz SA. First evidence of long-term health damage from ecigs: Smoking E-Cigarettes Daily Doubles Risk of Heart Attacks UCSF Centre for Tobacco Control Research and Education. 2018. Available from: <https://tobacco.ucsf.edu/first-evidence-long-term-health-damage-ecigs-smoking-e-cigarettes-daily-doubles-risk-heart-attacks>.

Thompson A. E-cigarettes are as dangerous as smoking - just ONE puff could be all it takes to increase the risk of a heart attack. Daily Mail, 2017. Available from: <http://www.dailymail.co.uk/health/article-4789246/ONE-e-cig-puff-increases-risk-heart-attack.html>

No authors listed. E-cigarettes containing nicotine linked to raised heart attack risk The Guardian, , 2017. Available from: <https://www.theguardian.com/society/2017/sep/11/e-cigarettes-containing-nicotine-linked-to-raised-heart-attack-risk>

Glantz S. First evidence that e-cig use increases heart attacks, independent of the effect of smoking cigarettes. Center for Tobacco Control Research and Education (UCSF) 2017. Available from: <https://tobacco.ucsf.edu/first-evidence-e-cig-use-increases-heart-attacks-independent-effect-smoking-cigarettes>.

Glantz S. Nicotine and ultrafine particles: Reasons to worry about e-cig-induced heart attacks. Center for Tobacco Control, Research and Education University of California, San Francisco 2014. Available from: <http://tobacco.ucsf.edu/nicotine-and-ultrafine-particles-reasons-worry-about-e-cig-induced-heart-attacks>.

18.6.3.2 Stroke

Australia Institute of Health and Welfare. Heart, stroke and vascular disease: Australian facts: Stroke. Canberra, Australia: AIHW, 2024. Available from: <https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/all-heart-stroke-and-vascular-disease/stroke>.

Australia Institute of Health and Welfare. Heart, stroke and vascular disease: Australian facts. Canberra, Australia: AIHW, 2021. Available from: <https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/all-heart-stroke-and-vascular-disease/coronary-heart-disease>.

Cai K. Teen's Two-Pod A Day Juul Addiction Caused Massive Stroke, Lawsuit Says. Forbes. 2019. Available from: <https://www.forbes.com/sites/kenrickcai/2019/07/18/teen-two-pod-a-day-juul-addiction-caused-massive-stroke-lawsuit-vaping-e-cigarettes/#104576df6ace>.

Waghorn M. E-cigs could raise the risk of suffering a stroke more than smoking. Daily Mirror, 2017. Available from: <http://www.mirror.co.uk/science/e-cigs-could-raise-risk-9906545>

18.6.3.3 Other cardiovascular conditions

Australia Institute of Health and Welfare. Heart, stroke and vascular disease: Australian facts: High blood pressure. Canberra, Australia: AIHW, 2024. Available from:

<https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/risk-factors/high-blood-pressure>.

Australia Institute of Health and Welfare. Heart, stroke and vascular disease: Australian facts. Canberra, Australia: AIHW, 2021. Available from: <https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/all-heart-stroke-and-vascular-disease/coronary-heart-disease>.

Australia Institute of Health and Welfare. High blood pressure. Canberra, Australia: AIHW, 2019. Available from: <https://www.aihw.gov.au/reports/risk-factors/high-blood-pressure/contents/summary>.

18.6.3.4 Short-term effects of e-cigarettes on the cardiovascular system

No authors listed. E-cigarettes may slow down your heart rate. Medical News Today. 2017. Available from: <https://stockpricesnow.com/e-cigarettes-may-slow-down-your-heart-rate-medical-news-today/>.

18.6.3.5 Cardiovascular effects of e-cigarette use compared to smoking

No authors listed. E-cigarettes increase cardiovascular risk as much as cigarettes do. Science Daily. 2018. Available from: <https://www.sciencedaily.com/releases/2018/07/180709111130.htm>.

18.6.3.6 Dual use of e-cigarettes and conventional cigarettes

18.6.3.7 Animal studies

No authors listed. Vaping tied to blood clots—in mice. Medical XPress. 2018. Available from: <https://medicalxpress.com/news/2018-07-vaping-tied-blood-clotsin-mice.html>.