SUPPLEMENTARY MATERIAL

Electronic cigarettes and health with special focus on cardiovascular effects

Position Paper of the European Association of Preventive Cardiology (EAPC)

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CONTENT

ADDITIONAL REFERENCES FOR THE MAIN MANUSCRIPT

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Additional references for "INTRODUCTION"

1. Seltzer CC. Framingham study data and "established wisdom" about cigarette smoking and coronary heart disease. *J Clin Epidemiol*. 1989; 42: 743-50.

Additional references for "PREVALENCE OF E-CIGARETTE SMOKING"

1. Echevarria C and Sinha IP. Heterogeneity in the measurement and reporting of outcomes in studies of electronic cigarette use in adolescents: a systematic analysis of observational studies. *Tob Control*. 2017; 26: 247-53.
2. Gravely S, Fong GT, Cummings KM, et al. Awareness, trial, and current use of electronic cigarettes in 10 countries: Findings from the ITC project. *Int J Environ Res Public Health*. 2014; 11: 11691-704.
3. El-Shahawy O, Park SH, Duncan DT, et al. Evaluating state-level differences in e-cigarette and cigarette Use among adults in the United States between 2012 and 2014: findings from the National Adult Tobacco Survey. *Nicotine Tob Res*. 2019; 21: 71-80.
4. Bao W, Xu G, Lu J, Snetselaar LG and Wallace RB. Changes in electronic cigarette use among adults in the United States, 2014-2016. JAMA. 2018; 319: 2039-41.
5. Kilibarda B, Mravcik V and Martens MS. E-cigarette use among Serbian adults: prevalence and user characteristics. *Int J Public Health*. 2016; 61: 167-75.
6. Kuendig H, Notari L and Gmel G. La cigarette électronique en Suisse en 2015 - analyse des données du Monitorage suisse des addictions. Lausanne, Switzerland: Addiction Suisse, 2016, p. 33.
7. Kong G, Idrisov B, Galimov A, Masagutov R and Sussman S. Electronic cigarette use among adolescents in the Russian Federation. *Subst Use Misuse*. 2017; 52: 332-9.
8. Reid JL, Rynard VL, Czoli CD and Hammond D. Who is using e-cigarettes in Canada? Nationally representative data on the prevalence of e-cigarette use among Canadians. *Prev Med*. 2015; 81: 180-3.
9. Thrasher JF, Abad-Vivero EN, Barrientos-Gutierrez I, et al. Prevalence and correlates of e-cigarette perceptions and trial among early adolescents in Mexico. *J Adolesc Health*. 2016; 58: 358-65.
10. Lee JA, Kim SH and Cho HJ. Electronic cigarette use among Korean adults. *Int J Public Health*. 2016; 61: 151-7.
11. Chang HC, Tsai YW, Shiu MN, Wang YT and Chang PY. Elucidating challenges that electronic cigarettes pose to tobacco control in Asia: a population-based national survey in Taiwan. *BMJ open*. 2017; 7: e014263.

12. Ganasegeran K and Rashid A. Clearing the clouds-Malaysia's vape epidemic. *Lancet Respir Med*. 2016; 4: 854-6.

13. Palipudi KM, Mbulo L, Morton J, et al. Awareness and current use of electronic cigarettes in Indonesia, Malaysia, Qatar, and Greece: Findings From 2011-2013 Global Adult Tobacco Surveys. *Nicotine Tob Res*. 2016; 18: 501-7.

14. Tabuchi T, Shinozaki T, Kunugita N, Nakamura M and Tsuji I. Study Profile: The Japan "Society and New Tobacco" Internet Survey (JASTIS): A longitudinal internet cohort study of heat-not-burn tobacco products, electronic cigarettes and conventional tobacco products in Japan. *J Epidemiol*. 2019; 29: 444-50.

15. Jiang N, Chen J, Wang MP, et al. Electronic cigarette awareness and use among adults in Hong Kong. *Addict Behav*. 2016; 52: 34-8.

16. Jiang N, Wang MP, Ho SY, Leung LT and Lam TH. Electronic cigarette use among adolescents: a cross-sectional study in Hong Kong. *BMC Public Health*. 2016; 16: 202.

17. Xiao L, Parascandola M, Wang C and Jiang Y. Perception and current use of e-cigarettes among youth in China. *Nicotine Tob Res*. 20189; 21: 1401-7.

18. Harrold TC, Maag AK, Thackway S, Mitchell J and Taylor LK. Prevalence of e-cigarette users in New South Wales. *Med J Aust*. 2015; 203: 326.

19. Li J, Newcombe R and Walton D. The prevalence, correlates and reasons for using electronic cigarettes among New Zealand adults. *Addict Behav*. 2015; 45: 245-51.

20. White J, Li J, Newcombe R and Walton D. Tripling use of electronic cigarettes among New Zealand adolescents between 2012 and 2014. *J Adolesc Health*. 2015; 56: 522-8.

21. McCabe SE, West BT, Veliz P and Boyd CJ. E-cigarette use, cigarette smoking, dual use, and problem behaviors among U.S. adolescents: results from a National Survey. *J Adolesc Health*. 2017; 61: 155-62.

22. McMillen RC, Gottlieb MA, Shaefer RM, Winickoff JP and Klein JD. Trends in electronic cigarette use among U.S. adults: use is increasing in both smokers and nonsmokers. *Nicotine Tob Res*. 2015; 17: 1195-202.

23. Cavalcante TM, Szklo AS, Perez CA, et al. Electronic cigarette awareness, use, and perception of harmfulness in Brazil: findings from a country that has strict regulatory requirements. *Cad Saude Publica*. 2017; 33 Suppl 3: e00074416.

24. Lee JA, Kim SH and Cho HJ. Electronic cigarette use among Korean adults. *Int J Public Health*. 2016; 61: 151-7.

25. Tabuchi T, Shinozaki T, Kunugita N, Nakamura M and Tsuji I. Study Profile: The Japan "Society and New Tobacco" Internet Survey (JASTIS): A longitudinal internet cohort study of heat-not-burn tobacco products, electronic cigarettes and conventional tobacco products in Japan. *J Epidemiol*. 2019; 29: 444-50.

26. Wang X, Zhang X, Xu X and Gao Y. Electronic cigarette use and smoking cessation behavior among adolescents in China. *Addict Behav*. 2018; 82: 129-34.

27. Twyman L, Watts C, Chapman K and Walsberger SC. Electronic cigarette use in New South Wales, Australia: reasons for use, place of purchase and use in enclosed and outdoor places. *Aust N Z J Public Health*. 2018; 42: 491-6.

28. Goniewicz ML, Smith DM, Edwards KC, et al. Comparison of nicotine and toxicant exposure in users of electronic cigarettes and combustible cigarettes. *JAMA Netw Open*. 2018; 1: e185937.

29. Echevarria C and Sinha IP. Heterogeneity in the measurement and reporting of outcomes in studies of electronic cigarette use in adolescents: a systematic analysis of observational studies. *Tob Control*. 2017; 26: 247-53.

30. Babineau K, Taylor K and Clancy L. Electronic cigarette use among Irish youth: a cross sectional study of prevalence and associated factors. *PloS one*. 2015; 10: e0126419.

31. Bunch K, Fu M, Ballbe M, et al. Motivation and main flavour of use, use with nicotine and dual use of electronic cigarettes in Barcelona, Spain: a cross-sectional study. *BMJ open*. 2018; 8: e018329.

32. Goniewicz ML, Leigh NJ, Gawron M, et al. Dual use of electronic and tobacco cigarettes among adolescents: a cross-sectional study in Poland. *Int J Public Health*. 2016; 61: 189-97.

33. Levy DT, Yuan Z and Li Y. The prevalence and characteristics of e-cigarette users in the U.S. *Int J Environ Res Public Health*. 2017; 14.

34. Smith DM, Gawron M, Balwicki L, Sobczak A, Matynia M and Goniewicz ML. Exclusive versus dual use of tobacco and electronic cigarettes among adolescents in Poland, 2010-2016. *Addict Behav*. 2018; 90: 341-8.

35. Andler R, Guignard R, Wilquin JL, Beck F, Richard JB and Nguyen-Thanh V. Electronic cigarette use in France in 2014. *Int J Public Health*. 2016; 61: 159-65.

36. Jeon C, Jung KJ, Kimm H, et al. E-cigarettes, conventional cigarettes, and dual use in Korean adolescents and university students: Prevalence and risk factors. *Drug Alcohol Depend*. 2016; 168: 99-103.

Additional references for "UPTAKE OF E-CIGARETTES IN THE YOUNG"

1. Porter L, Duke J, Hennon M, et al. Electronic cigarette and traditional cigarette use among middle and high school students in Florida, 2011-2014. *PLoS One*. 2015; 10: e0124385.

2. Kinnunen JM, Ollila H, Minkkinen J, Lindfors PL and Rimpela AH. A longitudinal study of predictors for adolescent electronic cigarette experimentation and comparison with conventional smoking. *Int J Environ Res Public Health*. 2018; 15.

3. Thorndike AN. E-cigarette use by young adult nonsmokers: next-generation nicotine dependence? *Ann Intern Med*. 2019; 170: 70-1.

Additional references for "LEGISLATION"

1. Lempert LK, Grana R and Glantz SA. The importance of product definitions in US e-cigarette laws and regulations. *Tob Control*. 2016; 25: e44-51.
2. Barraza LF, Weidenaar KE, Cook LT, Logue AR and Halpern MT. Regulations and policies regarding e-cigarettes. *Cancer*. 2017; 123: 3007-14.
3. Cousins S. India advises against electronic nicotine delivery systems. *Lancet*. 2018; 392: 809.
4. Hammond D, White CM, Czoli CD, Martin CL, Magennis P and Shiplo S. Retail availability and marketing of electronic cigarettes in Canada. *Can J Public Health*. 2015; 106: e408-12.
5. Williams RS, Derrick J, Liebman AK, LaFleur K and Ribisl KM. Content analysis of age verification, purchase and delivery methods of internet e-cigarette vendors, 2013 and 2014. *Tob Control*. 2018; 27: 287-93.
6. Laestadius LI, Wahl MM, Pokhrel P and Cho YI. From Apple to Werewolf: A content analysis of marketing for e-liquids on Instagram. *Addict Behav*. 2019; 91: 119-27.
7. Basanez T, Majmundar A, Cruz TB, Allem JP and Unger JB. E-cigarettes are being marketed as "Vitamin Delivery" devices. *Am J Public Health*. 2019; 109: 194-6.
8. European Commission. Revision of the Tobacco Products Directive In: DG Health and Food Safety, (ed.). Brussels, Belgium; 2016.
9. https://publichealthlawcenter.org/resources/us-e-cigarette-regulations-50-state-review
10. Rose A, Filion KB, Eisenberg MJ and Franck C. Electronic cigarettes: A comparison of national regulatory approaches. *Can J Public Health*. 2015; 106: e450-3.
11. Cheng KW, Chaloupka FJ, Shang C, et al. Prices, use restrictions and electronic cigarette use-evidence from wave 1 (2016) US data of the ITC Four Country Smoking and Vaping Survey. *Addiction*. 2019.

Additional references for "EFFECT OF E-CIGARETTES ON CARDIOVASCULAR FUNCTION AND CARDIOVASCULAR DISEASE"

1. Williams M, Villarreal A, Bozhilov K, Lin S and Talbot P. Metal and silicate particles including nanoparticles are present in electronic cigarette cartomizer fluid and aerosol. *PLoS One*. 2013; 8: e57987.
2. Benowitz NL and Fraiman JB. Cardiovascular effects of electronic cigarettes. *Nat Rev Cardiol*. 2017; 14: 447-56.
3. Yatsuya H, Folsom AR and Investigators A. Risk of incident cardiovascular disease among users of smokeless tobacco in the Atherosclerosis Risk in Communities (ARIC) study. *Am J Epidemiol*. 2010; 172: 600-5.

4. Zhang G, Wang Z, Zhang K, et al. Safety Assessment of Electronic Cigarettes and Their Relationship with Cardiovascular Disease. *Int J Environ Res Public Health*. 2018; 15.

5. Peters A, Dockery DW, Muller JE and Mittleman MA. Increased particulate air pollution and the triggering of myocardial infarction. *Circulation*. 2001; 103: 2810-5.

6. Kloog I, Coull BA, Zanobetti A, Koutrakis P and Schwartz JD. Acute and chronic effects of particles on hospital admissions in New-England. *PLoS One.* 2012; 7: e34664.

7. Vansickel AR and Eissenberg T. Electronic cigarettes: effective nicotine delivery after acute administration. *Nicotine Tob Res*. 2013; 15: 267-70.

8. Leventhal AM, Strong DR, Kirkpatrick MG, et al. Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. *JAMA*. 2015; 314: 700-7.

9. Peterson LA and Hecht SS. Tobacco, e-cigarettes, and child health. *Curr Opin Pediatr*. 2017; 29: 225-30.

10. Bold KW, Krishnan-Sarin S and Stoney CM. E-cigarette use as a potential cardiovascular disease risk behavior. *Am Psychol*. 2018; 73: 955-67.

11. Vlachopoulos C, Ioakeimidis N, Abdelrasoul M, et al. Electronic cigarette smoking increases aortic stiffness and blood pressure in young smokers. *J Am Coll Cardiol*. 2016; 67: 2802-3.

12. Szoltysek-Boldys I, Sobczak A, Zielinska-Danch W, Barton A, Koszowski B and Kosmider L. Influence of inhaled nicotine source on arterial stiffness. *Przegl Lek*. 2014; 71: 572-5.

13. Antoniewicz L, Bosson JA, Kuhl J, et al. Electronic cigarettes increase endothelial progenitor cells in the blood of healthy volunteers. *Atherosclerosis*. 2016; 255: 179-85.

14. Jensen RP, Luo W, Pankow JF, Strongin RM and Peyton DH. Hidden formaldehyde in e-cigarette aerosols. *N Engl J Med*. 2015; 372: 392-4.

15. Benowitz NL. Clinical pharmacology of nicotine: implications for understanding, preventing, and treating tobacco addiction. *Clin Pharmacol Ther*. 2008; 83: 531-41.

16. Farsalinos KE, Spyrou A, Tsimopoulou K, Stefopoulos C, Romagna G and Voudris V. Nicotine absorption from electronic cigarette use: comparison between first and new-generation devices. *Sci Rep*. 2014; 4: 4133.

17. 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; 49: e13077.

18. Farsalinos KE, Tsiapras D, Kyrzopoulos S, Savvopoulou M and Voudris V. Acute effects of using an electronic nicotine-delivery device (electronic cigarette) on myocardial function: comparison with the effects of regular cigarettes. *BMC Cardiovasc Disord*. 2014; 14: 78.

19. Moheimani RS, Bhetraratana M, Peters KM, et al. Sympathomimetic effects of acute e-cigarette use: role of nicotine and non-nicotine constituents. *J Am Heart Assoc*. 2017; 6.

20. Anderson JO, Thundiyil JG and Stolbach A. Clearing the air: a review of the effects of particulate matter air pollution on human health. *J Med Toxicol*. 2012; 8: 166-75.

21. Fernandez E, Ballbe M, Sureda X, Fu M, Salto E and Martinez-Sanchez JM. Particulate Matter from Electronic Cigarettes and Conventional Cigarettes: a Systematic Review and Observational Study. *Curr Environ Health Rep*. 2015; 2: 423-9.

22. Czogala J, Goniewicz ML, Fidelus B, Zielinska-Danch W, Travers MJ and Sobczak A. Secondhand exposure to vapors from electronic cigarettes. *Nicotine Tob Res*. 2014; 16: 655-62.

23. Pope CA, 3rd, Burnett RT, Krewski D, et al. Cardiovascular mortality and exposure to airborne fine particulate matter and cigarette smoke: shape of the exposure-response relationship. *Circulation*. 2009; 120: 941-8.

24. Hartmann-Boyce J, McRobbie H, Bullen C, Begh R, Stead LF and Hajek P. Electronic cigarettes for smoking cessation. *Cochrane Database Syst Rev*. 2016; 9: CD010216.

Additional references for "Figure 1 Legend"

1. Filippidis FT, Laverty AA, Gerovasili V and Vardavas CI. Two-year trends and predictors of e-cigarette use in 27 European Union member states. *Tob Control*. 2017; 26: 98-104.

2. McMillen RC, Gottlieb MA, Shaefer RM, Winickoff JP and Klein JD. Trends in electronic cigarette use among U.S. adults: use is increasing in both smokers and nonsmokers. *Nicotine & tobacco research*. 2015; 17: 1195-202.

3. Cavalcante TM, Szklo AS, Perez CA, et al. Electronic cigarette awareness, use, and perception of harmfulness in Brazil: findings from a country that has strict regulatory requirements. *Cad Saude Publica*. 2017; 33Suppl 3: e00074416.

4. Lee JA, Kim SH and Cho HJ. Electronic cigarette use among Korean adults. *Int J Public Health*. 2016; 61: 151-7.

5. Tabuchi T, Shinozaki T, Kunugita N, Nakamura M and Tsuji I. Study Profile: The Japan "Society and New Tobacco" Internet Survey (JASTIS): A longitudinal internet cohort study of heat-not-burn tobacco products, electronic cigarettes and conventional tobacco products in Japan. *J Epidemiol*. 2019; 29: 444-50.

6. Wang X, Zhang X, Xu X and Gao Y. Electronic cigarette use and smoking cessation behavior among adolescents in China. *Addict Behav*. 2018; 82: 129-34.

7. Twyman L, Watts C, Chapman K and Walsberger SC. Electronic cigarette use in New South Wales, Australia: reasons for use, place of purchase and use in enclosed and outdoor places. *Aust N Z J Public Health*. 2018; 42: 491-6.