

## The World Foundation for Natural Science The New World Franciscan Scientific Endeavour of The New World Church Restoring and Heating the World through Responsibility and Commitment in accord with Natural and Divine Law!



## **The Danger of Electronic Cigarettes:**

Creating a new generation of nicotine addicts

Smoking is recognized as one of the most preventable causes of death globally. Seven million people die every year around the world from a smoking-related cause. In many parts of the world, such as China, smoking is effectively unregulated – you can smoke anywhere and everywhere. As half of the Chinese male population smoke, China will see in years to come a massive increase in death rates unless it takes action now to reverse the influence of tobacco companies there. In the Western world, in particular, where anti-smoking regulation is stronger, an alternative product has emerged: the electronic cigarette. The uptake of this product, especially from teenagers and young adults, has been rapid. In the United States, this has been described as an "epidemic" and a massive step backwards in public health: electronic cigarette companies have behaved like the tobacco companies of old in how they promote e-cigarettes. Given that nearly all e-cigarette companies are owned or part-owned by tobacco companies, this is hardly surprising. Some but not all governments in Western countries are making efforts to regulate the rise of e-cigarettes, especially as more and more studies emerge showing how harmful e-cigarettes are, how addictive they are, how they don't help smokers quit and how they act as a gateway to cigarettes! But teenagers and young adults especially are still taking to vaping in the false believe they are harmless and not addictive. This Fact Sheet presents a summary of the evidence and presents steps that can be taken to prevent the rise of the electronic cigarettes, the new tobacco.

## Are electronic cigarettes 95 % safer than tobacco?

In 2015, the Public Health England agency (PHE) of the UK government announced that e-cigarettes are 95% safer than tobacco.1 This single event boosted the small e-cigarette industry onto front page news around the world. E-cigarettes have been in high demand everywhere ever since. PHE continues to promote their claim and now recommends vaping in all public spaces, such as hospitals<sup>2</sup>, even stating pregnant women who are smokers, should consider an alternative nicotine delivery system<sup>3</sup> (i.e. an electronic cigarette), rather than their taking this wonderful life opportunity to quit entirely by implying that nicotine has little effect on a foetus. However, nicotine has a potentially dangerous effect: nicotine is recognized as stimulating nicotinic acetylcholine receptors (nAChRs) by binding to them affecting transmission of outgoing signals for the sympathetic and parasympathetic SVStems; activation of nAChRs at the foetal stage of development leads to cell apoptosis and mitotic abnormalities.4 Also, infants born to smoking mothers are at increased risk

of developing nicotine dependence later in life because newly-born children of smoking mothers develop withdrawal symptoms to nicotine.<sup>5</sup> Given the addictive element of tobacco is nicotine, might we assume the same effect on the baby of a mother who vapes?



Fig. 1: Teenagers and young adults are becoming addicted to electronic cigarettes at an alarming rate, beginning the process of renormalising smoking behavior in society.

So are e-cigarettes really 95% less harmful than tobacco? Is PHE telling the truth? PHE's claim of 95% safer was taken from a research paper<sup>6</sup> that its authors admitted had no hard evidence for and a number of its authors are connected to and even paid by the vaping and tobacco industry.<sup>7</sup> The Lancet and British Medical Journal both wrote exposés of PHE's claim. The Lancet wrote that PHE's statement was based upon an "extraordinarily flimsy foundation" and that the editors publishing that paper warned readers about 'potential conflicts of interest' associated with this work.<sup>8</sup> The BMJ went further in their exposure of the Nutt paper and the lead PHE authors, highlighting their direct connections and relationships to the tobacco and vaping industries, and each other.<sup>9</sup>

The weight of evidence is contrary to the PHE's irresponsible stance. This is no better expressed than in the United States. The Food and Drugs Administration have declared vaping is at epidemic levels among children and has threatened strong sanctions against these companies.<sup>10</sup> The electronic cigarette company making the biggest headlines in the FDA crackdown is Juul.<sup>11</sup>

### 'Juuling' a new vape generation

In the United States, the uptake of electronic cigarettes in schools has become an epidemic with a 78% rise from 2017-2018 in high school users of e-cigarettes to 3 million (1-in-5 high school children). There was also a near 50% rise in middle school use to close to 600,000 (1-in-20 children).12 This massive rise is mostly through the use of Juul. But we should not underestimate the effect that Public Health England has had on promoting e-cigarettes as safe. Mitch Zeller, Director of the FDA's Centre for Tobacco Products has explained that: "about 80% of youth see no problem in the use of e-cigarettes."13 What's more, high school children are using electronic cigarettes to vape cannibis<sup>14</sup>, which has a recognized damaging effect on adolescents' brain development and other health effects.<sup>15</sup>

Juul, like many modern e-cigarettes, is a sleek device that looks more like a USB memory flash-drive. Juul was heavily promoted via social media to young adults. Juul's manufacturer used the same techniques in selling it as the tobacco industry did: sex appeal, rebelliousness and independence.<sup>16</sup> In December 2018 Juul sold a 35% stake in its business to Altria, owner of the tobacco company Philip Morris which makes Marlboro cigarettes, for \$12.8bn, giving Juul access to Altria product shelf space and its expertise in distribution and supply globally.<sup>17</sup> Altria also invested \$1.8bn in Canadian cannabis company, Cronos Group, as it looks to keep itself maintaining revenues<sup>18</sup> through the more popular methods of smoking among the youth: e-cigarettes and cannabis.



Fig. 2: Advertising for electronic cigarettes matches that of tobacco in its heyday. This product is advertised like a tech gadget. It's goal to be attractive to younger generations.

The Juul e-cigarette, in the US, contains massively high levels of nicotine. Though it is claimed that each pod contains the same amount of nicotine as a packet of cigarettes, the evidence isn't clear – each person reacts differently but suffice to say, the level of nicotine absorbed is significantly higher than other e-cigarettes.<sup>19</sup> However, Juul is now developing a lower nicotine pod but one that delivers more nicotine in the vapour to maximize the amount of nicotine absorbed in the body. In other countries where Juul is sold, there are lower legal limits for nicotine content. Juul is currently designing a lower nicotine base product for the European market, though one that delivers through a higher voltage a greater nicotine hit than it claims on the pod.<sup>20</sup>

Irrespective of the limit, nicotine is extremely addictive especially for young people and alters how their brain functions.<sup>21</sup> 90% of smokers begin in their teens and become addicted very quickly. Nearly all e-cigarettes contain nicotine. As well as being extremely addictive, nicotine is recognized as increasing the risk of heart and lung disease, gastrointestinal disorders, decreased immune response, and reduces reproductive health. Nicotine also negatively affects cell proliferation, oxidative stress, apoptosis, and DNA mutation by various mechanisms which leads to cancer. It also affects tumour proliferation and metastasis.22 Nicotine is not harmless by any means.

All e-cigarette manufacturers produce flavoured e-liquids. These flavours range from cotton candy to gummy bears to bubble gum to fruity flavours all the way up to tobacco flavours. There are some 7,700 distinct flavours on the English-speaking market.<sup>23</sup> The evidence is conclusive that sweet flavours attract children to vaping and mask the unpleasant content.<sup>24</sup>

# What are the health effects of vaping?

First and foremost, there are no positive effects of vaping whatsoever. Nicotine brings no physical or mental health benefits. Nicotine does not promote weight loss, nor does it relieve stress or improve concentration, nor does it have a positive impact on any range of diseases such as Parkinson's. These are all arguments that have been promoted by Big Tobacco over the last 50 years in attempts to keep smoking popular and to take attention away from the death and suffering it knowingly causes.<sup>25</sup> Nicotine is highly addictive plus has a documented number of health threats all by itself as reported by the US Surgeon General's 2014

Do electronic cigarettes contain anything harmful?	
Ingredient	Effect
2,3-Pentanedione	Respiratory tract irritation; causes skin irritation; causes eye irritation
Acetoin	Flammable and toxic (can convert to diacetyl)
Acrolein (aldehyde)	Strongly linked to lung cancer
Acetaldehyde	Class 1 carcinogen; damages DNA.
Aldehyde (in fla- vours)	Primary irritant of mucosal tissue of respiratory tract. Levels identified as a "toxicological concern".
Arsenic	Class 1 carcinogen
Benzene	Class 1 carcinogen
Cadmium	Potentially fatal respiratory tract and kidney problems, carcinogen.
Copper	Depression, one study on cause of rectal cancer, can result in genetic disorder.
Diacetyl	'Popcorn worker's lung' disease.
Ethyl vanillin (fla- vour)	Anemia, diarrhea and lack of weight gain (in rabbits); mild irritant in humans.
Formaldehyde	Class 1 carcinogen. One study found formaldehyde to be 10 times higher than that in tobacco cigarettes.
Propylene Glycol (anti- freeze)	Eye, throat, and airway irritation, asthma (90% of e-cig liquid)
Isoprene	Blood damage, spinal cord damage, reproductive organ failure, organ cancer.
Lead	For children: behaviour and learning problems; lower IQ, hyperactivity; slowed growth; hearing problems; anemia, seizures, coma and death.
Nickel	Allergic reaction, bronchitis, lung failure; kidney problems; between 2 and 100 times higher than found in Marlboro cigarettes
Nicotine	Extremely addictive, triggers cancerous cells and pulmonary disease, can cause cancer.
Nicotine liquid (freebase)	If swallowed, it can be deadly. In its purest form, nicotine can kill with one drop on the skin. Nicotine liquid has been identified as poisonous <sup>59</sup> and sadly at least one child has died from swallowing the liquid. <sup>60</sup>
Nicotine salts	Delivers higher dosage and more easily absorbed nicotine; nicotine salts have been patented as an insecticide.
Nitric Oxide	Causes pulmonary inflammation.
N-Nitrosonor- nicotine	Class 1 carcinogen
Silver	Poorly absorbed heavy metal but if silver nitrate it is quite toxic, causing paralysis or respiratory arrest.
Tin	Potentially as toxic as cyanide depending upon compounds.
Toluene	Headaches, sleepiness, impairs thinking, death, damages kidneys and reproductive capabilities.
Vanillin (flavour)	Cause of genetic damage especially lymphocytes.
Ultrafine particles (2nd and 3rd-hand vaping)	Everything breathed in esp. nicotine: potentially resulting in asthma, constricted arteries, heart attacks.

Tab. 1: The evidence clearly shows that the vapour in electronic cigarettes contains a mixture of carcinogens and toxins<sup>61</sup>. report.<sup>26</sup> It is recognized that vaping is linked to:

Cardiovascular disease<sup>27 28</sup>

 $\bullet$  Lung disease including emphysema  $^{29\ 30}$ 

- Necrosis of tissue around wounds<sup>31</sup>
- Gum disease<sup>32</sup> and oral cancer<sup>33</sup>

 In fetuses, changes in brain gene expression that can lead to mental health and development problems<sup>34</sup>

All of these health effects are similar to the destructive effects of smoking.

# Do electronic cigarettes help people quit smoking?

No. Smokers who turn to electronic cigarettes continue to smoke.<sup>37</sup> Smokers who vape are less likely to quit than smokers who never vaped; dual users (using both tobacco and electronic cigarettes) are in fact 28% less likely to quit!<sup>38</sup> All the e-cigarette does is allow smokers to vape, to get a dose of the nicotine drug, in places where they are not permitted to smoke. Fortunately, legislation is catching up to block the use of e-cigarettes in public places in many parts of the world.

## Second-hand vaping

The evidence indicates that it's possible to breathe in ultrafine particles of nicotine, carcinogens and other toxins from the cloud of vapour exhaled by someone else, especially in indoor spaces.<sup>39 40</sup> Just as second-hand smoking is identified as a cause of disease and death, vaping is showing itself to be a second-hand cause of harm. Indeed, it has even been identified that 3rd hand vaping - where the toxins from vapour, especially nicotine, are found in the hair, clothes or even furniture of a vaper is possible. So being around someone who vapes isn't safe.41 Parents who vape around their children should think again. In confined spaces such as a car, this is potentially very dangerous for the child.



Fig. 3: Nicotine is harmful to foetuses, causing the same effects as tobacco smoke. Secondhand vaping is a proven fact where the exhaled vapour is inhaled by those nearby. Electronic cigarettes are not safe or healthy for your family.

## The 'gateway effect': from e-cigarettes to tobacco

Once children start vaping they are also more likely to try tobacco cigarettes. Study after study has shown a correlation that those who vape are between 4 and 6-times more likely to try a cigarette than those who never vaped.<sup>42</sup> 43 44 Such is the strength of the evidence that vaping has been labelled the "gateway" to tobacco. In the world of smoking, it's well established that 90% of smokers start in their teens.45 Tobacco companies don't bother to target post teenage adults in Western countries because in these nations very few people start smoking once in their twenties.<sup>46</sup> But e-cigarettes are changing that! Young adults [18-30 year olds] who have taken up vaping are up to 6.8 times more likely to smoke tobacco than those who never vaped!<sup>47</sup>

### The long-term benefits?

There is an idea that switching to vaping entirely will bring about a "harm reduction" in the population and save thousands of lives every year. Smoking kills 7 million people per year! As an industry it should be

removed from the face of the planet. So the attraction is strong to switch entirely to vaping. However, the evidence of long-term health improvement is questionable. The US National Academy of Sciences conducted a full scientific review of 800 published studies on e-cigarettes.48 NAS concluded that if all current adult smokers switched to e-cigarettes, then in 30-40 years there would potentially be a less harmed population. But because of the massive take-up by children and young adults of e-cigarettes, NAS concluded that the longer-term picture (50 years from now when these children reach mid-60s to early 70s in age) the health of the population would be worse. Given that vaping is a gateway to smoking, it's even more logical to conclude this. Interestingly, the "harm reduction" and "smoke-free world" idea is primarily promoted by the tobacco industry and especially Philip Morris International as it seeks to promote its own versions of electronic cigarettes into the wealthier parts of the world.

### A word on heat-not-burn tobacco electronic cigarettes

There has been a recent push for 'innovative' smoking products among tobacco companies. Though in a

sense this is nothing new as tobacco companies have long been developing alternative smoking products, there has been a recent whirlwind of promotion of such products, notably the rise of Philip Morris International's (PMI) tobacco heat-not-burn product, iQOS, and their promotion of a 'smoke-free world.'49 The Foundation for a Smokefree World is funded to the amount of US \$80 million annually by Philip Morris International. Though the stated purpose of this initiative is to end smoking in this generation, its method is to substitute tobacco for... tobacco! And call it 'harm reduction'! Indeed. the Smokefree World foundation has written to the United Nations to state that 'harm reduction' is a valid goal.<sup>50</sup> By harm reduction, they mean: use an alternative smoking device, such as an electronic cigarette or a heatnot-burn electronic cigarette, which Philip Morris manufactures and sells. It's clear that electronic cigarettes are as toxic as tobacco. What about heat-not-burn e-cigarettes?

Heat-not-burn electronic cigarettes are similar to electronic cigarettes in that they produce a vapour cloud and are not combusted. But the heatnot-burn products contain tobacco in a powder form, that when heated electronically produces a vapour rather than smoke. Philip Morris's iQOS is gaining popularity in Europe but it is currently most successful in Japan and China.

The evidence on heat-not-burn e-cigarettes is alarming: these heat-notburn products produce similar carcinogenic and toxicological effects to tobacco. Tobacco companies have been trying to push these products onto the market as safer than tobacco for over 20 years.<sup>51</sup> But study after study after study shows that heat-notburn tobacco products produce, time and again, the same carcinogens<sup>52</sup> and toxins<sup>53</sup> <sup>54</sup> <sup>55</sup> as tobacco. Indeed, PMI's own data on health risk biomarkers from iQOS has been found not to be detectibly different from those found in tobacco.56

The industry publically claim their product is 90-95% safer than tobac- $co^{57}$  (there's that 95% safer again – are

they all singing from the same hymn sheet?!) similar in effect to breathing air in terms of increasing the risk of emphysema and cardiovascular disease!<sup>58</sup> PMI at the same time is continuing to promote and sell tobacco into Asia and Africa. "Harm reduction" and "Smoke-free world" are all-in-all a well-organised ruse to sell e-cigarettes and create a new generation of nicotine addicts.

#### What can you do?

- 1. First and foremost, for adults and parents, set an example: don't smoke, don't vape, don't take drugs.
- 2. Educate yourself about vaping.
- 3. Educate your child about the harm of vaping and smoking.
- 4. Be aware of who your child's friends are: do they smoke or vape? It's likely your child will start if a friend does.
- 5. Talk to your child's school and to the children there.
- 6. Write to your local councils and demand smoke- and vape-free outdoor areas for children especially and for a ban on flavoured e-liquids in stores.
- Write to your politicians to present the facts about vaping and ask for electronic cigarettes to be treated the same as tobacco

   and kept from public view in shops and petrol stations, and all indoor vaping should be banned.
- 8. If you know someone who vapes, some of the best advice on how to quit completely comes from Allen Carr's Easyway. Get the book.
- 9. Pass this fact sheet to people who need it: doctors, family, friends, parents, schools...

#### References

1 https://www.gov.uk/government/news/e-cigarettes-around-95-less-harmful-than-tobacco-estimates-landmark-review [accessed 15-11-2018]. Note the dot gov.uk site states this page was published 19 Aug 2015. The fact that it is still available online promotes the message that PHE and hence the UK government still believe the 95% safer statement to be true. Indeed, PHE's February 2018 review makes the same 95% safer claim in its press release: https://phe-newsroom.prgloo. com/news/phe-publishes-independent-expert-ecigarettes-evidence-review [accessed 6-12-2018].

2 Department of Health (2017), Towards a Smokefree Generation: A Tobacco Control Plan for England, https://assets.publishing.service.gov. uk/government/uploads/system/uploads/attach ment\_data/file/630217/Towards\_a\_Smoke\_free\_ Generation\_-\_A\_Tobacco\_Control\_Plan\_for\_England\_2017-2022\_\_2.pdf

3 Public Health England (2 March 2018), Evidence review of e-cigarettes and heated tobacco products 2018: executive summary, https://www.gov.uk/ government/publications/e-cigarettes-and-heatedtobacco-products-evidence-review/evidence-review-of-e-cigarettes-and-heated-tobacco-products-2018-executive-summary#perceptions-of-relativeharms-of-nicotine-e-cigarettes-and-smoking

4 R. Wickström (2007), Effects of Nicotine During Pregnancy: Human and Experimental Evidence, Curr Neuropharmacol. Sep; 5(3): 213–222.

5 V. Godding et al. (2004), Does in utero exposure to heavy maternal smoking induce nicotine withdrawal symptoms in neonates? Pediatr Res. Apr;55(4):645-51.

6 D. Nutt et al. (2014) Estimating the harms of nicotine-containing products using the MCDA approach. European Addiction Research, 20 (5). pp. 218-225

7 J. Gornall, "Public Health England's troubled trail", BMJ 2015;351:h5826 (published 3 November 2015)

8 The Lancet, "E-cigarettes: Public Health England's evidence-based confusion", v.386 Aug 29, 2015, p829

9 Will Stahl-Timmins (2015) Vaper Trails, BMJ, https://www.bmj.com/content/351/bmj.h5826/infographic [accessed 05-12-2018]

10 The Washington Post (12 September 2018), "FDA chief calls youth e-cigarettes an 'epidemic'", https://www.washingtonpost.com/national/healthscience/fda-chief-calls-youth-use-of-juul-other-ecigarettes-an-epidemic/2018/09/12/

11 FDA (24 April 2018), Statement from FDA Commissioner Scott Gottlieb, M.D., on new enforcement actions and a Youth Tobacco Prevention Plan to stop youth use of, and access to, JUUL and other e-cigarettes, https://www.fda.gov/NewsEvents/ Newsroom/PressAnnouncements/ucm605432.htm

12 Centers for Disease Control and Prevention (CDC), "Notes from the Field: Use of Electronic Cigarettes and Any Tobacco Product Among Middle and High School Students — United States, 2011– 2018", Morbidity and Mortality Weekly Report, November 16, 2018 / 67(45);1276–1277, https:// www.cdc.gov/mmwr/volumes/67/wr/mm6745a5. htm?s\_cid=mm6745a5\_w

13 CNN (19 September 2018), "High school bathrooms across US will soon have e-cigarette warnings", https://www.abc15.com/news/health/ high-school-bathrooms-across-us-will-soon-havee-cigarette-warnings

14 M. Morean et al. (2014), High School Students' Use of Electronic Cigarettes to Vaporize Cannabis, Pediatrics, October, VOLUME 136 / ISSUE 4, 611-616 15 https://www.naturalscience.org/news/2018/12/ cannabis-no-harmless-wonder-medicine/

16 Stanford University, Research Into The Impact of Tobacco Advertising (SRITA), http://tobacco. stanford.edu/tobacco\_main/index.php See for yourself how similar Juul and other e-cigarettes advertisements are to tobacco cigarettes! [accessed 05-12-2018].

17 Kevin Burns, CEO, JUUL Labs, JUUL STATE-MENT ABOUT ALTRIA MINORITY INVESTMENT AND SERVICE AGREEMENTS, https://newsroom. juul.com/2018/12/20/juul-statement-about-altriaminority-investment-and-service-agreements/ [accessed 15-1-2019]

18 Ben Tobin (20 Dec 2018), Altria purchases 35% stake in Juul in deal worth \$12.8 billion, USA TODAY, https://eu.usatoday.com/story/money/2018/12/20/altria-buys-stake-juul-deal-worth-12-8-billion/2373663002/ [accessed 15-1-2019]

19 G. Erskine (5 Jun 2018), How Much Nicotine Is In A JUUL? — Nic Salts and How They Work https://expertvaping.com/how-much-nicotine-is-in-ajuul/ [accessed 17 Dec 2018]. It's noteworthy to read that this pro-vaping site – and there are others – publicly states it no longer endorses Juul.

20 The New York Times (27 November 2018), Juul's New Product: Less Nicotine, More Intense Vapor, https://www.nytimes.com/2018/11/27/ health/juul-ecigarettes-nicotine.html

21 J. Dwyer et al., The Dynamic Effects of Nicotine on the Developing Brain, Pharmacol Ther. 2009 May; 122(2): 125–139.

22 A. Mishra et al. Harmful effects of nicotine, Indian J Med Paediatr Oncol. 2015 Jan-Mar; 36(1): 24–31.

23 Zhu S-H, Sun JY, Bonnevie E, et al., Four hundred and sixty brands of e-cigarettes and counting: implications for product regulation, Tob Control 2014; 23:iii3–iii9.

24 T. Ferkol, H. Farber, S. La Grutta et al. Electronic cigarette use in youths: a position statement of the Forum of International Respiratory Societies, Eur Respir J 2018; 51: 1800278

25 S. Glantz, J. Slade, L. Bero, P. Hanauer and D. Barnes (1996), The Cigarette Papers, University of California Press.

26 US Department of Health and Human Services, The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General, 2014 http://www.surgeongeneral.gov/library/reports/50-years-of-progress/sgr50-chap-5.pdf

27 C. Vlachopoulos et al. Electronic Cigarette Smoking Increases Aortic Stiffness and Blood Pressure in Young Smokers, Journal of the American College of Cardiology, Volume 67, Issue 23, 14 June 2016, Pages 2802-2803 http://dx.doi. org/10.1016/j.jacc.2016.03.569

28 T. Alzahrani et al.. Association Between Electronic Cigarette Use and Myocardial Infarction. Am J Prev Med. 2018 Aug 17. pii: S0749-3797(18)31871-3. https://www.ncbi.nlm.nih.gov/ pubmed/30166079

29 M. Perez et al. E-cigarette use is associated with emphysema, chronic bronchitis and COPD. Presented at: American Thoracic Society 2018 International Conference; May 18-23, 2018; San Diego, CA. Poster 402. http://www.abstractsonline. com/pp8/#!/4499/presentation/19432

30 C. Glynos et al. (2018), Comparison of the effects of e-cigarette vapor with cigarette smoke on lung function and inflammation in mice, American Journal of Physiology Lung Cellular and Molecular Biology, https://doi.org/10.1152/ajplung.00389.2017

31 A. Rau et al. Electronic Cigarettes Are as Toxic

to Skin Flap Survival as Tobacco Cigarettes. Ann Plast Surg. 2017 Mar 1. https://www.ncbi.nlm. nih.gov/pubmed/28252546

32 I. Sundar et al. E-cigarettes and flavorings induce inflammatory and pro-senescence responses in oral epithelial cells and periodontal fibroblasts. Oncotarget. 2016; 7:77196-77204

33 International Association for Dental Research (29 July 2018) E-cigarettes and tobacco product use linked to increased risk of oral cancer, https://www.sciencedaily.com/ releases/2018/07/180729194047.htm?utm\_ medium=cpc&utm\_campaign=S

34 L. England et al. (2015) Nicotine and the Developing Human: A Neglected Element in the Electronic Cigarette Debate, Am J Prev Med. 2015 Aug;49(2):286-93. http://doi.org/10.1016/j. amepre.2015.01.015

35 American Association for the Advancement of Science (12 February 2016) Alternative Tobacco Products May Be Just As Dangerous As Cigarettes https://www.aaas.org/news/alternative-tobacco-products-may-be-just-dangerouscigarettes

36 To quote Professor Stanton Glantz, perhaps the world's leading researcher in tobacco control and e-cigarettes (3 September 2015): "E-cigarette use is particularly problematic for pregnant teens and young women, since exposure to nicotine and other chemicals during pregnancy can contribute to small babies, premature birth, and stillbirth." https://tobacco.ucsf.edu/calif-healthwatchdog-finds-high-levels-cancer-causing-chemicals-majority-nearly-100-e-cigarettes-tested [accessed 8 December 2018].

37 QuickStats: Cigarette Smoking Status Among Current Adult E-cigarette Users, by Age Group — National Health Interview Survey, United States, 2015. MMWR Morb Mortal Wkly Rep 2016;65:1177. DOI: http://dx.doi.org/10.15585/ mmwr.mm6542a7

38 S. Kalkhoran and S. Glantz (2016) E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and metaanalysis, The Lancet Respiratory Medicine, v4 (2), pp116-128, Feb 01, https://doi.org/10.1016/ S2213-2600(15)00521-4. This article presents a systematic review of the literature on cessation and vaping. It received angry responses from the pro-vaping community (particularly PHE) but its method and analysis is sound. (Incidental studies, such as that conducted by Allen Carr in 2014 found that of 1,000 of its clients who had taken up vaping as a means to quit tobacco, 84 % kept smoking: Allen Carr's Easyway (2015) Your Personal Stop Smoking Plan, Arcturus Publishing).

39 M. Ballbe et al. (2014), Cigarettes vs. e-cigarettes: Passive exposure at home measured by means of airborne marker and biomarkers, Environmental Research, Volume 135, November 2014, Pages 76-80, https://doi.org/10.1016/j. envres.2014.09.005

40 C. Czogala et al. (2014) Secondhand exposure to vapors from electronic cigarettes. Nicotine Tob Res. Jun;16(6):655-62. https://doi. org/10.1093/ntr/ntt203

41 M. Goniewicz and L. Lee (2015), Electronic Cigarettes Are a Source of Thirdhand Exposure to Nicotine, Nicotine & Tobacco Research, Volume 17, Issue 2, 1 February, pp.256–258, https://doi.org/10.1093/ntr/ntu152

42 M. Conner et al. (2018), Do electronic cigarettes increase cigarette smoking in UK adolescents? Evidence from a 12-month prospective study, BMJ Tobacco Control;27:365-372. This study found that 34% of 13-14 year-old school children from 20 English schools have tried e-cigarettes and one-in-four went on to try tobacco.

43 R. Miech et al. E-cigarette use as a predictor of cigarette smoking: Results from a 1-year

follow-up of a national sample of 12th grade students. Tob Control https://doi.org/10.1136/ tobaccocontrol-2016-053291. This study found grade 12 students four times more likely to move to tobacco from e-cigarettes and those who were former smokers but had taken to e-cigarettes were returning to tobacco. As the paper concludes: "These results contribute to the growing body of evidence supporting vaping as a oneway bridge to cigarette smoking among youth. Vaping as a risk factor for future smoking is a strong, scientifically-based rationale for restricting youth access to e-cigarettes."

44 J. Barrington-Trimis et al. (2016), E-Cigarettes and Future Cigarette Use, Pediatrics, 2016, v138 (1), http://pediatrics.aappublications.org/content/138/1/e20160379. This study found 11-12 graders were six times more likely to try tobacco if they vaped.

45 United States Department of Health and Human Services. Substance Abuse and Mental Health Services Administration. Center for Behavioral Health Statistics and Quality. National Survey on Drug Use and Health, 2014. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2016-03-22. https://doi.org/10.3886/ICPSR36361.v1

46 Philip J. Hilts (1996), Smokescreen: The Truth Behind the Tobacco Industry Cover-up, Addison-Wesley.

47 B. Primack et al. (2018) Initiation of Traditional Cigarette Smoking after Electronic Cigarette Use Among Tobacco-Naïve US Young Adults, Am J Med. Apr;131(4):443.e1-443.e9. https:// doi.org/10.1016/j.amjmed.2017.11.005

48 National Academies of Sciences, Engineering, and Medicine. 2018. Public Health Consequences of E-Cigarettes. Washington, DC: The National Academies Press. https://doi. org/10.17226/24952

49 The Foundation for a Smokefree World: https://www.smokefreeworld.org

50 https://www.smokefreeworld.org/sites/default/files/uploads/reflections/fsfw\_who\_letter\_ jan\_2019.pdf

51 J. Slade et al. (2002), Eclipse: does it live up to its health claims? Tobacco Control, 11 (Suppl. II): ii64-ii70.

52 R. Auer, N. Concha-Lozano et al. "Heat-Not-Burn Tobacco Cigarettes: Smoke by Any Other Name" JAMA Intern Med. 2017;177(7):1050-1052. doi:10.1001/jamainternmed.2017.1419

53 M. Katz, MD, "No Smoke—Just Cancer-Causing Chemicals", JAMA Intern Med. 2017;177(7):1052. doi:10.1001/jamainternmed.2017.1425

54 Stanton Glantz, Professor of Medicine and Tobacco Control at UC San Francisco states: "IQOS emissions create risks of immunosuppression and pulmonary toxicity, so FDA should not accept PMI reduced risk claim" https://tobacco.ucsf.edu/iqos-emissions-createrisks-immunosuppression-and-pulmonary-toxicity-so-fda-should-not-accept-pmi-reduced-riskclaim (November 20th 2017)

55 F. Moazed et al. Assessment of industry data on pulmonary and immunosuppressive effects of IQOS, Tob Control 2018;27:s20–s25. doi:10.1136/tobaccocontrol-2018-054296

56 S. Glantz (2018), PMI's own in vivo clinical data on biomarkers of potential harm in Americans show that IQOS is not detectably different from conventional cigarettes. Tob Control. 2018 Nov;27(Suppl 1):s9-s12. doi: 10.1136/tobacco-control-2018-054413

57 https://iqosscience.com/en [accessed July 31 2018]

58 https://pmiscienceusa.com/what-is-heat-notburn/the-science-behind-heat-not-burn/ - this is Philip Morris's own public-facing research website. It's really just a marketing window. Look at their bar charts to see what I mean about having similar risk levels to breathing air [accessed July 31 2018].

59 The New York Times, "Selling a Poison by the Barrel: Liquid Nicotine for E-Cigarettes", 23rd March 2014, http://www.nytimes. com/2014/03/24/business/selling-a-poison-bythe-barrel-liquid-nicotine-for-e-cigarettes.html?\_ r=1

60 The Inquisitor, "E-Cigarettes Tragedy: 'Vaping' Claims Life of Toddler", 13th December 2014. http://www.inquisitr.com/1677808/ecigarettes-tragedy-vaping-claims-life-of-toddler/

61 This table is a reorganized version of that found in: K. Cox (2016), E-Cigarettes: Re-inventing smoking: creating a new generation of smokers, CreateSpace Independent Publishing, ISBN: 978-1537717630. References to ingredients and effects are listed there.



Fig. 4: Find out more about cannabis smoking and electronic cigarettes in our brochures. Please pass these brochures to your family and friends to read.

#### Imprint

Publisher The World Foundation for Natural Science

Editor

Paul Probst, European President

Author Dr. Karl Cox, Senior Lecturer, University of Brighton, UK

Layout & Artwork Franz Ulrich

Photo Credits

1: AdobeStock 2: Jurate Clark 3: Istock 4: The World Foundation for Natural Science

#### **Order Address**

The World Foundation for Natural Science European Headquarters P.O. Box 7995 6000 Lucerne 7, Switzerland **T**-Phone: +41(41)798-0398 **O**-Fax: +41(41)798-0399 **T**-E-mail: EU-HQ@NaturalScience.org www.NaturalScience.org

© copyright by

The World Foundation for Natural Science 02/19