

The pulmonary effects of e-cigarettes

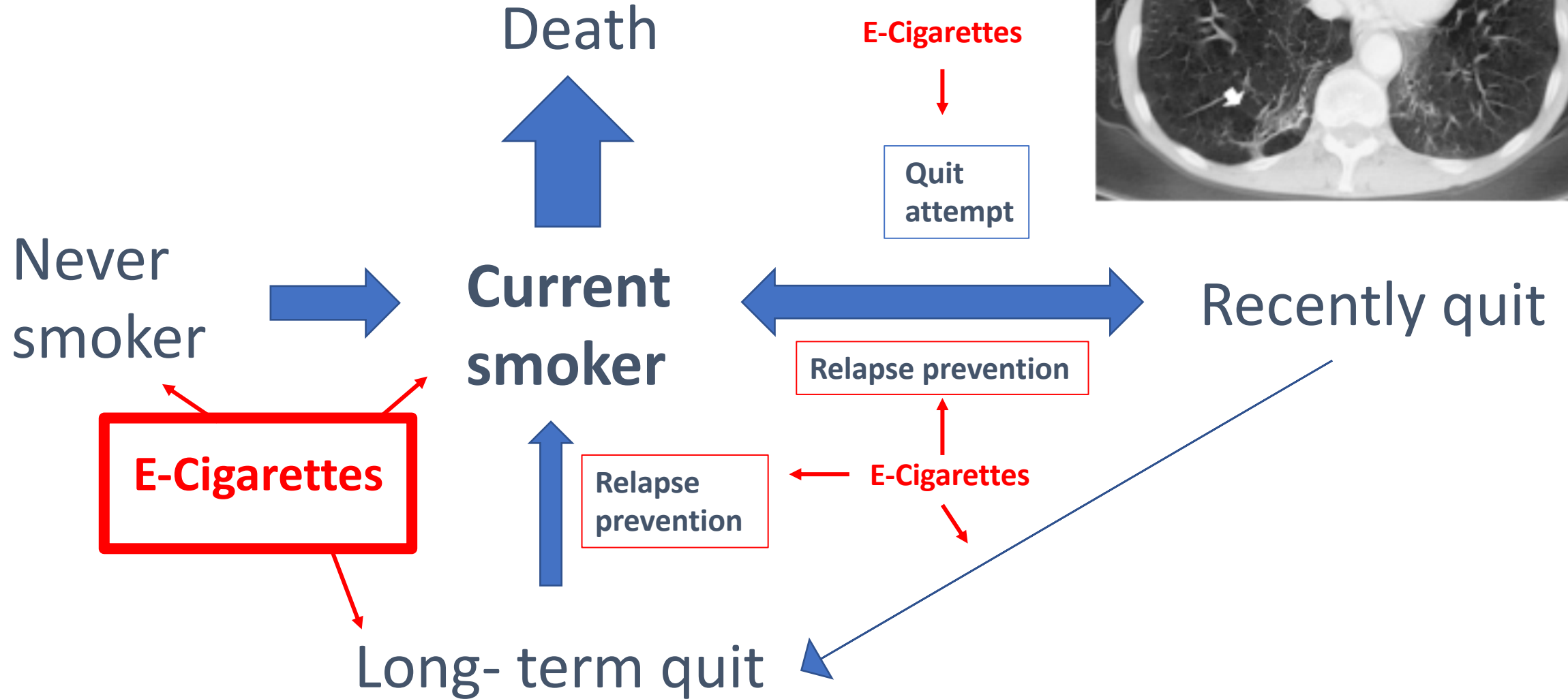
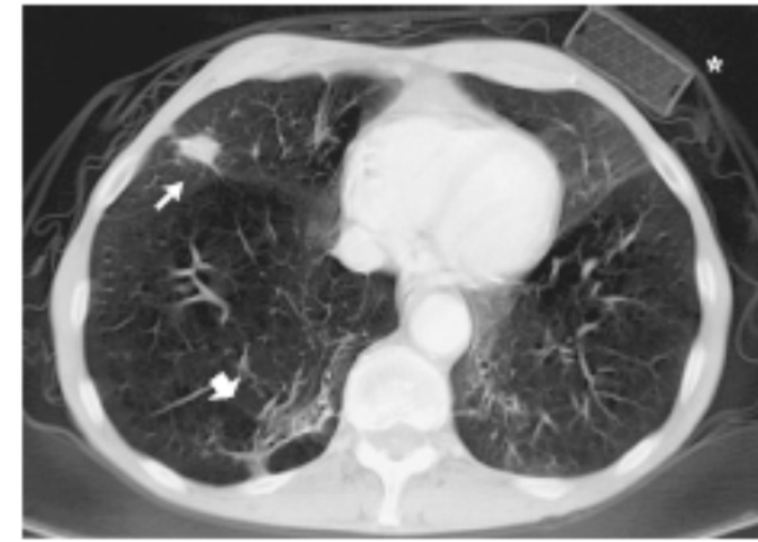
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Tobacco addiction



Questions – Pulmonary effects of e-cigarettes

Current & prior use of combusted tobacco

Age, duration & frequency of use

Presence of pre-existing lung disease

Other lung toxicants eg cannabis

Complicated by:

Study design & confounding

Verification of exposure/ outcome –self report, tests, medical record

Rapidly evolving e-cigarette devices

Regulation

Constituents of e-cigarettes

Nicotine

Propylene glycol

Glycerine

Flavours

**Range and levels of harmful constituents
much lower than in tobacco smoke**

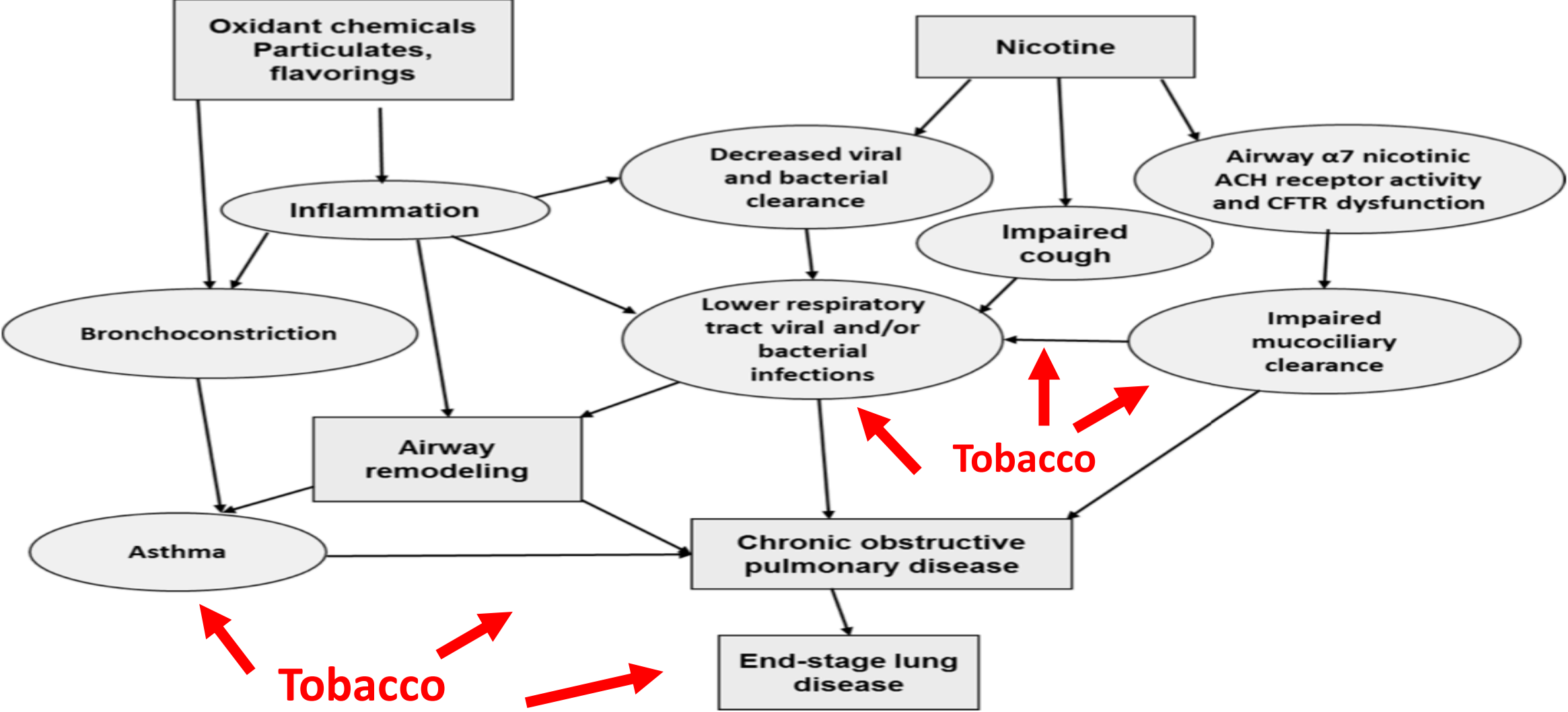
Contaminants –thermal degradation,
impurities, device related

Public Health England. Evidence review of e-cigarettes and heated tobacco products 2018

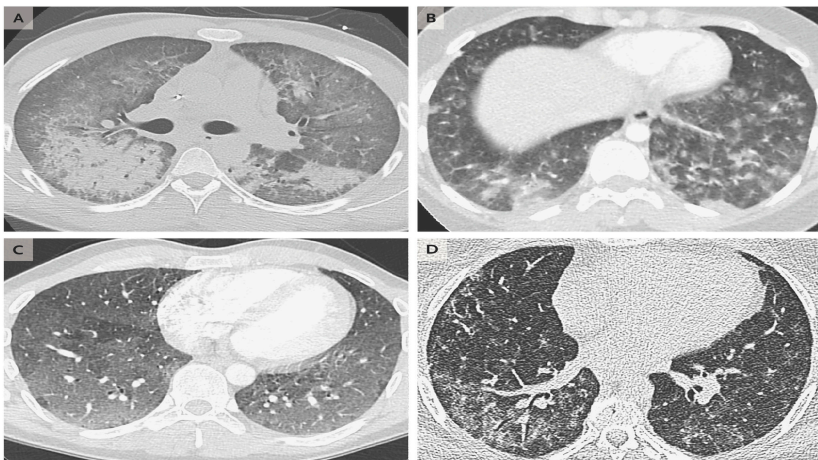
<https://cot.food.gov.uk/sites/default/files/2020-09/COT%20E%28N%29NDS%20statement%202020-04.pdf>

<https://www.nap.edu/catalog/24952/public-health-consequences-of-e-cigarettes>

E-cigarettes & lung disease – plausible?



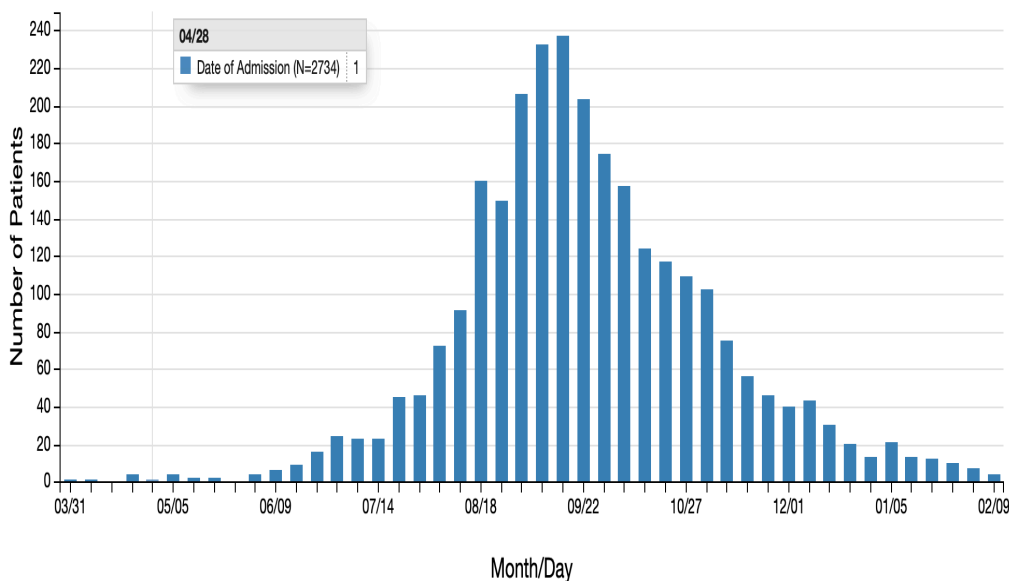
US outbreak of lung disease



- Consolidation and ground glass
- Acute eosinophilic pneumonia
- Hypersensitivity pneumonitis
- Giant cell interstitial pneumonia
- Diffuse alveolar damage
- Reactive pneumocytes
- Foreign material
- Lipid

N Engl J Med 2019; 381:1486-1487

N Engl J Med 2020; 382:387-390



THC & Vit E acetate related, USA specific
UK MHRA - 84 reports 2016-2020 (> 3M e-cig users)
1.5 -2 M tobacco related UK hospital admissions 2016-20
UK - EU TPD & MHRA regulation

Long term pulmonary health outcomes & e-cigarettes

| Study | Setting | Population | Intervention | Comparator | Outcome |
|-----------------------|----------------------------|----------------|---|------------------------|---|
| Flacco 2019 Cohort | Italy Community setting | Adults (30-75) | E-cigarette use (any model, nicotine / no nicotine) AND cigarette smoking | Cigarette smoking only | <ul style="list-style-type: none">Diagnosed disease |
| Xie 2020 Cohort | USA National survey | Adults (18+) | Exposure to e-cigarettes | None | <ul style="list-style-type: none">Association between e-cigarette use and respiratory disease |

Flacco M E, *et al*, (2019) Cohort study of electronic cigarette use: safety and effectiveness after 4 years of follow-up. *European review for medical and pharmacological sciences* 23(1), 402-41

Xie W *et al* Association of Electronic Cigarette Use With Incident Respiratory Conditions Among US Adults From 2013 to 2018 *JAMA Network Open*. 2020;3(11):e2020816. doi:10.1001/jamanetworkopen.2020.20816

Long term pulmonary effects of tobacco

| Respiratory disease | Estimated relative risks (95% CI) for smoking, relative to non-smokers | | |
|--|--|------------------|--|
| | Current smokers | Former smokers | Source |
| Chronic Obstructive Pulmonary Disease (COPD) | 4.01 (3.18 - 5.05) | 3.13 (1.24–7.87) | Jayes et al (2016) Kamal et al (2015) |
| Lung Cancer | 10.92 (8.28-14.40) | 3.85 (2.77-5.34) | Jayes et al (2016) |
| Asthma | 1.61 (1.07-2.42) | | Jayes et al (2016) |
| Tuberculosis | 1.57 (1.18-2.10) | | Jayes et al (2016) |
| Pneumonia | 2.18 (1.69-2.80) | | Royal College of Physicians (2018) |
| Influenza | clinically diagnosed 1.34 (1.13-1.59) | | Royal College of Physicians (2018) |
| | microbiologically confirmed 5.69 (2.79-11.60) | | Royal College of Physicians (2018) |
| Idiopathic Pulmonary fibrosis | 1.58 (1.27–1.97) | | Taskar et al (2006) |
| Obstructive sleep apnoea | 1.97 (1.02-3.82) | | Jayes et al (2016) |

Pulmonary effects of e-cigarettes

*Conclusion 11-1. There is **no available evidence** whether or not e-cigarettes cause respiratory diseases in humans.*

*Conclusion 11-2. There is **limited evidence** for improvement in lung function and respiratory symptoms among adult smokers with asthma who switch to e-cigarettes completely or in part (dual use).*

*Conclusion 11-3. There is **limited evidence** for reduction of chronic obstructive pulmonary disease (COPD) exacerbations among adult smokers with COPD who switch to e-cigarettes completely or in part (dual use).*

*Conclusion 11-4. There is **moderate evidence** for increased cough and wheeze in adolescents who use e-cigarettes and an association with e-cigarette use and an increase in asthma exacerbations.*

*Conclusion 11-5. There is **limited evidence** of adverse effects of e-cigarette exposure on the respiratory system from animal and in vitro studies.*

Plausible risk of:

Airways disease

Hypersensitivity pneumonitis

Lung Cancer

Pulmonary Fibrosis

BUT less than with tobacco use

Modifiable – product design & regulation

What should we do?

Risk lens:

- Uptake in adolescents - **mitigate**
- Treatment of tobacco dependency - **optimise**
- Potential health harms - **mitigate**

Proportionate regulation - risk 'trade-offs', vigilance, research

Erku *et al.* Framing and scientific uncertainty in nicotine vaping product regulation: An examination of competing narratives among health and medical organisations in the UK, Australia and New Zealand . International Journal of Drug Policy 78 (2020)