Key focus

- The VAPOUR (cardioVasculAr and respiratory imPacts Of the Use of electRonic cigarettes) studies
- How the regulation of e-cigarettes impacts upon research methods.

1. I am a vascular surgery speciality registrar and am currently undertaking a 3-year PhD fellowship funded by a British Heart Foundation Centre of Research Excellence award (RE/13/5/30177) at the Institute of Cardiovascular and Medical Sciences, University of Glasgow, under the supervision of Professors Christian Delles and Rhian Touyz. My PhD is focused on investigating the cardiovascular effects of e-cigarettes. I have no links to any e-cigarette or tobacco manufacturers.

2. Our primary research focuses on the use of biomarker and physiological function studies to provide insight into pathophysiological and clinical aspects of e-cigarettes in comparison to tobacco cigarette smoking and conventional nicotine replacement therapies. In order to address this aim we have designed and conducted the VAPOUR studies. The VAPOUR Studies investigate the immediate and short-term cardiorespiratory effects of e-cigarettes.

3. In the acute exposure study, we evaluated the effects of nicotine-containing e-cigarettes compared to tobacco cigarettes on vascular function, respiratory function and circulating microparticles (MPs), particularly platelet MPs (PMPs, biomarkers of thrombosis) and endothelial MPs (EMPs, biomarkers of endothelial function). The vascular and respiratory function tests demonstrated that following e-cigarette exposure there was an increase in reactive hyperaemia index (a measure of endothelial function), an increase in augmentation index (a measure of vascular stiffness), and a decrease in peak expiratory flow (a measure of lung function). Following tobacco cigarette exposure, the number of EMPs and PMPs significantly increased. Following electronic cigarette exposure there was no change in EMPs, whereas the number of PMPs were significantly increased. E-cigarette exposure therefore elicits acute effects on the cardiovascular and respiratory system. However, the long-term effects of e-cigarettes and their association with cardiovascular and respiratory disease await further clarification.

4. In our ongoing randomised controlled trial in smokers undergoing a 12-week NHS smoking cessation programme (ClinicalTrials.gov NCT03358953) we investigate the short-term effects of e-cigarettes on cardiovascular function in comparison to nicotine replacement patches. All participants undergo assessment of cardiovascular and respiratory function and give blood and urine samples at baseline and at end of the study. We study the function of blood vessels using an ultrasound test (endothelial function; flow mediated dilatation) and biomarkers in the urine and blood samples taken. Findings from this study will add to the body of evidence relating to the short-term cardiorespiratory health implications of e-cigarettes and thereby inform smokefree policies and provide guidance on the use of e-cigarettes as a smoking cessation tool.

5. The VAPOUR studies will have an important role in developing an understanding of any potential cardiovascular and respiratory risks associated with e-cigarette use and help direct future research into the long-term health effects of e-cigarettes.

6. Tobacco control policies have a significant impact our study design. For example, Article 5.3 of the WHO Framework Convention on Tobacco Control and the EU Tobacco Products Directive 2001/37/EC influenced the choice of products selected for our research. Local smokefree policies imposed constraints on where research could be conducted. Research into e-cigarettes may benefit from critical review of regulations in order to produce meaningful and unbiased data.

December 2017