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Cytotoxic effect of vehicular PM metals Fe$^{3+}$ & Zn$^{2+}$ on lung epithelia

C. Woods¹, G. J. Litherland¹, A. S. Hursthouse ², F. T. Lundy³, G. P. Sergeant⁴, J. C. Lockhart¹, I. S. McLellan²

Border & REGions Airways Training Hub¹ Institute of Biomedical & Environmental Health Research, School of Health & Life Sciences, University of the West of Scotland, Paisley, PA1 2BE, Scotland. ²School of Computing, Engineering & Physical Sciences, University of the West of Scotland. ³Wellcome-Wolfson Institute for Experimental Medicine, Queen’s University Belfast, Belfast, Northern Ireland ⁴Smooth Muscle Research Centre, Dundalk Institute of Technology, Dundalk, Ireland.

Chronic obstructive pulmonary disease prevalence and exacerbations are associated with elevated levels of air pollutants such as particulate matter (PM). The study of metal components gives an indication of health effects encompassing whole PM exposure. Effect of metal components on the respiratory system is in early stages of investigation. This research focuses on common PM metals (zinc & iron) which originate from a common pollutant source (vehicular emissions¹) and their action on lung epithelial cell lines; A549 & BEAS-2B.

Absolute metal concentration of analytical grade metal salts (FeCl₃ & ZnCl₂) were applied to A549 and BEAS-2B. After 24 h exposure, cytotoxicity was assessed using MTT metabolic assay and Interleukin (IL-6) production was determined using ELISA.

Zinc displayed a greater epithelial cytotoxicity potential than iron (IC₅₀ ~10 µg/ml cf. >100 µg/ml) on A549 & BEAS-2B (Fig. 1), conversely, iron stimulation demonstrated greater IL-6 production than zinc. Cell culture studies are currently ongoing.

![Figure 1: Fe$^{3+}$ & Zn$^{2+}$ ions displayed dose dependent cytotoxic effects on A549 (A) & BEAS-2B (B) at concentrations greater than 10 µg/ml. Mean ± SEM. --- IC₅₀ threshold. * p<0.05; **p<0.001. Significance determined using one-way ANOVA. n=3.](image-url)
Preliminary results indicate differential action of metals on lung epithelium. Identifying the impact of these pollutant components may help develop targeted approaches to improving air quality and overall lung health.