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Published in:
European Respiratory Journal

DOI:

Published: 28/10/2020

Document Version
Peer reviewed version

Link to publication on the UWS Academic Portal

Citation for published version (APA):

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

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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 emissions$^1$) and their action on lung epithelial cell lines; A549 & BEAS-2B.

Absolute metal concentration of analytical grade metal salts (FeCl$_3$ & ZnCl$_2$) 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 (IC$_{50}$ ~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.

![Graphs showing cytotoxicity and Interleukin production](image)

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. -- -- IC$_{50}$ threshold. * p<0.05, ** p<0.001. Significance determined using one-way ANOVA, n=3.
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.