SUPPLEMENTAL MATERIAL

Linking Oxidative Events to Inflammatory and Adaptive Gene Expression Induced by Exposure to an Organic PM Component

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The concentration of 1,2-NQ in samples of DEP has been reported to be between 13.7 ± 3.0 and 53 ± 5 ug/g, which is equivalent to 86.6-335 nmols 1,2-NQ/g DEP (Cho et al. 2004; Valavanidis et al. 2006).

In certain settings such as bus depots, garages and tunnels concentrations of DEP can reach or exceed 300 ug/m^3 DEP (NTP 2011). Assuming a ventilatory rate of 1 m^3/hr , a 3 hr exposure would produce an inhalational exposure to 0.9 mg of DEP. Using the concentrations above, this translates into an inhalational exposure to 77.9-302 pmols of 1,2-NQ.

Using the Weibel model of dichotomously branched conducting airways for generation 8 (with the trachea representing generation 1) yields approximately 100 cm^2 of ciliated epithelium. Considering generations 8 thru 11, the area would be approximately 1000 cm^2 (Weibel 1963). Estimating an average depth of periciliary fluid of 5 microns, gives a total volume of between 50 and 500 ul. Under this scenario, human airway epithelial cells could be exposed to concentrations to concentrations of 1,2-NQ between 0.16 and 6 uM *in vivo*.

These calculations assume 100 % tracheobronchial deposition of the inhaled DEP in generations 8-11. In reality, the rate of deposition of inhaled DEP particles (0.1-0.5 um) is fairly uniform throughout the conducting airways and is expected to be approximately 5 % (Choi and Kim 2007). At this rate, and factoring in a total periciliary volume of 2.4 ml (corresponding to generations 1 thru 17) would result in an effective concentration experienced by airway epithelial cells *in vivo* of approximately 6 nM.

These scenarios ignore other factors such as clearance and dissolution rates of 1,2-NQ. On the other hand, these calculations do not take into account zonal accumulation at bifurcations and focal deposition in disease states such as COPD, which can elevate local concentrations significantly above those in a healthy lung . For instance, local particle deposition at carinal ridges involves a surface area that is only 100 um x 100 um which provides an enhancement factor up to 100-fold. Considering an area 3 mm x 3 mm (which is still small by comparison to the cell culture surface area used in this study) would yield an enhancement factor of approximately 7-fold (Balashazy et al, 2003).

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