WHOLE BLOOD ASSAY WITH CELL ACTIVATION AND CYTOKINE RELEASE AS AN EX VIVO TOOL TO DESCRIBE EFFECTS AFTER INHALATIVE ZINC OXIDE EXPOSURE

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Occupational inhalation of high concentrations of zinc oxide particles (ZnO) may cause metal fume fever. Therefore, the effect on cells of the innate immunity involved in the release of pyrogenic and inflammatory cytokines is of interest. The study aim was to evaluate effects of acute inhalation of nano-sized ZnO particles on the cytokine release of in vitro stimulated cells (whole blood assay, WBA) from healthy volunteers. 16 healthy subjects were exposed to filtered air and ZnO particles (0, 0.5, 1.0 and 2.0 mg/m3) for 4 h on 4 different days. Blood was collected before and 24 hours after exposure and stimulated with endotoxin. IL (Interleukin)-1β and IL-8 release were quantified in the cell-free supernatant. Endotoxin was able to elicit cytokine release of blood cells collected without or after ZnO exposure in a dose-dependent manner. Stimulating cells e.g. with 40 pg/ml endotoxin showed high individual variability of IL-1β-(320 to 890 pg/ml) and IL-8- release (3300 to 17200 pg/ml). On the basis of six WBA without previous ZnO exposure an individual range of reactivity was described for each subject using double median absolute deviation. With respect to this model, an effect on cytokine release in samples after exposure was detectable in individual subjects whereupon an effect due to 0.5 mg/m3 ZnO was seen most frequently. Effects of acute zinc oxide exposure using WBA could be evaluated on an individual basis. However, it should be noted that cytokine release is not a marker of disease.