P98 AIRBORNE AND SYSTEMIC EXPOSURE TO MANGANESE AND IRON AMONG WELDERS

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Objectives This investigation aimed to estimate predictors and associations of airborne and systemic exposure to manganese (Mn) and iron (Fe) among welders.

Methods Personal air sampling of welding fumes was carried out in 241 welders during a shift. Metals were determined in the respirable and inhalable particle fraction. Mn in blood (MnB) and serum ferritin (SF) were determined in post-shift samples. The exposure variables were log-transformed for the estimation of predictors with multiple regression models.

Results Respirable Mn ranged up to 2400 µg/m^3 (median 62 µg/m^3) and comprised 82% of the concentrations in the inhalable fraction. Inhalable Fe was twofold higher than respirable Fe. Mn was correlated with Fe (respirable fraction: r=0.92). Statistical modelling revealed a good model fit for both metals in the welding fumes. The concentrations were mainly predicted by the type of welding process and modified by workplace characteristics. Model building revealed an influence of the parent metal on MnB and SF, respectively. However, internal exposure levels were only weakly influenced by welding-related factors due to biological regulation. Median MnB was 10.30 µg/l, median SF 131 µg/l. MnB and SF were not correlated (r=0.08).

Conclusions Welding resulted in similar Mn concentrations in both particle fractions of welding fumes, whereas inhalable Fe was twofold higher than respirable Fe. Biological regulation may at least partially explain the lack of association between MnB and SF. Mechanisms underlying Mn organ distribution and neurotoxicity need to be evaluated.