

Evaluation of Mercury in Urine as an Indicator of Exposure to Low Levels of Mercury Vapor

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We conducted a pooled analysis to investigate the relationship between exposure to elemental mercury in air and resulting urinary mercury levels, specifically at lower air levels relevant for environmental exposures and public health goals (i.e., < 50 $\mu\text{g}/\text{m}^3$ down to 1.0 $\mu\text{g}/\text{m}^3$). Ten studies reporting paired air and urine mercury data (149 samples total) met criteria for data quality and sufficiency. The log-transformed data set showed a strong correlation between mercury in air and in urine ($r = 0.774$), although the relationship was best fit by a series of parallel lines with different intercepts for each study ($R^2 = 0.807$). Predicted ratios of air to urine mercury levels at 50 $\mu\text{g}/\text{m}^3$ air concentration ranged from 1:1 to 1:3, based on the regression line for the studies. Toward the lower end of the data set (i.e., 10 $\mu\text{g}/\text{m}^3$), predicted urinary mercury levels encompassed two distinct ranges: values on the order of 20 $\mu\text{g}/\text{L}$ and 30–60 $\mu\text{g}/\text{L}$. Extrapolation to 1 $\mu\text{g}/\text{m}^3$ resulted in predicted urinary levels of 4–5 and 6–13 $\mu\text{g}/\text{L}$. Higher predicted levels were associated with use of static area air samplers by some studies rather than more accurate personal air samplers. Urinary mercury predictions based primarily on personal air samplers at 1 and 10 $\mu\text{g}/\text{m}^3$ are consistent with reported mean (4 $\mu\text{g}/\text{L}$) and upper-bound (20 $\mu\text{g}/\text{L}$) background levels, respectively. Thus, although mercury levels in air and urine are correlated below 50 $\mu\text{g}/\text{m}^3$, the impact of airborne mercury levels below 10 $\mu\text{g}/\text{m}^3$ is likely to be indistinguishable from background urinary mercury levels. *Key words:* air exposure, background urinary mercury levels, mercury vapor, pooled analysis, urinary mercury. *Environ Health Perspect* 111:623–630 (2003).