20. Beryllium Contamination inside Vehicles of Machine Shop Workers

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Inhalation of beryllium particles causes a chronic, debilitating lung disease in immunologically sensitized workers. Evidence that very low concentrations of beryllium may initiate this chronic disease is provided by incidences of the illness in family members exposed to beryllium dust from workers' clothes. Although workplace beryllium concentrations have decreased dramatically in the U.S. since chronic beryllium disease (CBD) was first described in the 1940s, it still continues to occur and has recently been documented in family members of beryllium-exposed workers. CBD and take-home beryllium exposures have not been reported in other countries, suggesting that beryllium exposures are lower internationally than in the U.S. or possibly the disease has been unrecognized.

This presentation describes the results of a cross-sectional survey to evaluate potential take-home beryllium exposures of workers at a precision machine shop manufacturing beryllium products, where seven cases of CBD have recently been diagnosed. Over 200 workers were employed at this plant and many of them did not change out of their work clothes and shoes at the end of their work shift; none of the workers showered before going home. Also, workers often used their personal vehicles during the work shift without changing clothes. We were concerned that these work practices served to increase the risk of beryllium exposure for workers' family members.

To evaluate whether workers were carrying beryllium home, surface concentrations were measured by collecting wipe samples from workers' hands as they were leaving work and inside their personal vehicles. These samples were analyzed for beryllium content by inductively coupled argon plasma-atomic emission spectroscopy. The results ranged widely, from non-detectable to 40 $\mu g/ft^2$ on the workers' hands and from non-detectable to 714 $\mu g/ft^2$ inside their vehicles. The highest beryllium concentrations inside the vehicles were found on the driver's floor (GM=19 $\mu g/ft^2$, GSD 4.9), indicating that workers were carrying beryllium home on their shoes.

A safe level of beryllium surface contamination is not known, but as an indicator of take-home exposures and increased risk for family members to inhale beryllium it is prudent to reduce surface concentrations and the potential for workers to carry beryllium away from the work site. Therefore, the wipe sampling results—showing that many workers both carried residual beryllium on their hands when

leaving work and had contaminated the inside of their vehicles—were presented to the workers and company management. Based on NIOSH recommendations, the company now requires all workers to wear coveralls and work shoes while working inside the plant and to shower before changing into their street clothes and shoes. To date, no cases of CBD have been diagnosed in family members of workers at this particular plant.

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