AN EVALUATION OF DIABETES MELLITUS, SERUM GLUCOSE, AND THYROID FUNCTION AMONG U.S. WORKERS EXPOSED TO 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN

Geoffrey M. Calvert, Marie Haring Sweeney, James Deddens, David K. Wall

Division of Surveillance, Hazard Evaluations and Field Studies,
National Institute for Occupational Safety & Health,
Centers for Disease Control and Prevention
4676 Columbia Parkway, R-21
Cincinnati, Ohio, USA 45226

Introduction
Some studies suggest that exposure to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) may affect glucose metabolism and thyroid function. To further assess the relationship between TCDD exposure and endocrine function, we examined data from the largest morbidity study of TCDD-exposed industrial workers.

Material and Methods
A cross-sectional study of workers employed at least 15 years earlier in the manufacture of 2,4,5-trichlorophenol or one of its derivatives at two U.S. chemical plants was conducted. The referent group consisted of individuals with no occupational exposure to phenoxy herbicides.

Results and Discussion
A total of 281 workers and 260 unexposed referents participated. The workers had substantial exposure to TCDD, as evidenced by a significantly elevated mean current serum lipid-adjusted TCDD concentration of 220 pg/gm lipid, compared with 7 pg/gm lipid among the referents. The halflife-extrapolated TCDD concentrations (the estimated TCDD concentration when occupational TCDD exposure ceased) among workers averaged 1900 pg/g lipid (range: not detected-30,000 pg/gm lipid). Overall, the prevalence of diabetes mellitus was not significantly different between the workers and referents. In addition, there was not a significant positive trend between prevalence of diabetes and increasing serum TCDD concentration. However, diabetes was found in 6 of 10 (60%) workers with current serum TCDD concentrations in excess of 1500 pg/gm lipid. In addition, after excluding subjects being treated for diabetes, workers in the group with the highest halflife-extrapolated TCDD concentrations had a significantly elevated adjusted mean serum glucose concentration compared to referents ($p=0.03$). Workers were also found to have a significantly higher adjusted mean free thyroxine

index (FTI) compared to referents (p=0.02), especially among workers in the group with the highest halflife-extrapolated TCDD concentrations. However, no evidence was found that TCDD-exposed workers were at increased risk for thyroid disease. These findings provide modest evidence that TCDD exposure may affect thyroid function and glucose metabolism. Further examination of these associations should be pursued.