

A COMPARISON OF SERUM PCDD, PCDF, AND PCB LEVELS FROM A COMMUNITY IN MICHIGAN, USA WITH THE UNITED STATES POPULATION

Hedgeman E¹, Chen Q², Gillespie BW², Franzblau A¹, Garabrant D¹

¹Department of Environmental Health Sciences, University of Michigan School of Public Health, 109 S Observatory, Ann Arbor, MI 48109; ²Department of Biostatistics, University of Michigan School of Public Health, 109 S Observatory, Ann Arbor, MI 48109

Keywords: Blood, Human Samples, Levels, North America, PCBs, PCDD/PCDF, TEQ

Introduction and Study Goals

The University of Michigan Dioxin Exposure Study (UMDES) was undertaken to determine whether environmental contamination downstream of the Dow Chemical Plant in Midland, MI is contributing to the body-burden of dioxins, furans and PCBs in the surrounding population. To investigate, blood samples taken from a randomized sample of the population living within three counties surrounding the Dow Chemical plant and the Tittabawassee River were compared to a referent population of individuals living in two removed counties. The referent counties, Jackson County and Calhoun County, Michigan, were chosen to represent a demographically comparable population with similar proportions of individuals employed in rural and industrial occupations.

The Center for Disease Control and Prevention sponsors an ongoing study of population health, the National Health and Nutrition Examination Survey (NHANES). Within the last decade NHANES has begun testing a small portion of participant's blood samples for dioxins, furans and PCBs. This data collected by NHANES is made publicly available for researcher use. Results from the most recent NHANES data release, years 2001 and 2002, is used as a national comparison for the serum levels of dioxins, furans and PCBs collected in the University of Michigan Dioxin Exposure Study.

Materials and Methods

The University of Michigan Dioxin Exposure Study collected serum samples from 946 individuals living in five counties in Michigan.^{1,2,3} To allow for a direct comparison with the NHANES sample, the UMDES dataset was limited to those participants 20 years of age and older. Additionally, the TEQ was recalculated (TEQ') for comparison with the 26 congeners analyzed by NHANES. UMDES results were sample weighted to reflect the true population distribution of the five sampled counties.

The 2001-2002 NHANES Laboratory 28POC dataset contains dioxin, furan, PCB and pesticide concentration data for 2547 individuals.^{4,5} Dioxin and furan concentrations were only analyzed for serum samples from individuals 20 years of age and older, limiting the dataset to 1693 observations. All lipid adjusted congeners were converted to picograms/gram for analysis; for values flagged as below the detection limit, the limit of detection was back-calculated from the LOD/ $\sqrt{2}$ value supplied by NHANES. A TEQ relating body-burden to TCDD equivalents was calculated with the 26 available congeners by multiplying each congener by its WHO toxic equivalency factor (TEF), then summing the weighted congeners. All congener data is sample weighted to the 2001-2002 United States population.

All statistics, including sample weighting, was performed using SAS version 9.1.

Results and Discussion

Results and discussion will be provided after August 15th, 2006.

Acknowledgements

The authors acknowledge the Dow Chemical Company for funding the study and Ms. Sharyn Vantine for her continued assistance.

References

1. Franzblau A, Garabrant D, Adriaens P, Gillespie BW, Demond A, Olson K, Ward B, Hedgeman E, Knutson K, Zwica L, Towey T, Chen Q, Ladronka K, Sinibaldi J, Chang S-C, Lee S-Y, Gwinn D, Sima C, Swan S, Lepkowski J. *Organohalogen Comp* (forthcoming).
2. Lepkowski J, Olson K, Ward B, Ladronka K, Sinibaldi J, Franzblau A, Adriaens P, Gillespie BW, Chang S-C, Chen Q, Demond A, Gwinn D, Hedgeman E, Knutson K, Lee S-Y, Sima C, Swan S, Towey T, Zwica L, Garabrant D. *Organohalogen Comp* (forthcoming).
3. Hedgeman E, Luksemburg W, Patterson D, Knutson K, Franzblau A, Garabrant D. *Organohalogen Comp* (forthcoming).
4. Centers for Disease Control and Prevention. National Center for Health Statistics. National Health and Nutrition Examination Survey Data. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2005. <http://www.cdc.gov/nchs/nhanes.htm>.
5. Centers for Disease Control and Prevention. National Center for Health Statistics. National Health and Nutrition Examination Survey Laboratory Protocol 28POC. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2005, http://www.cdc.gov/nchs/about/major/nhanes/lab01_02.htm.