

# NHANES 1999-2000 Public Release Data File

(November 2005)

## Lab28POC: Polychlorinated Dibenzo-*p*-Dioxins (PCDDs), Dibenzofurans (PCDFs), Non-Ortho-Substituted or Coplanar Polychlorinated Biphenyls (cPCBs), other Polychlorinated Biphenyls (PCBs), Persistent Chlorinated Pesticides and Selected Pesticide Metabolites

### Description

#### Polychlorinated Dibenzo-*p*-Dioxins (PCDDs), Dibenzofurans (PCDFs), Non-Ortho-Substituted or Coplanar Polychlorinated Biphenyls (cPCBs), Other Polychlorinated Biphenyls (PCBs), Persistent Chlorinated Pesticides and Selected Pesticide Metabolites

Organochlorines are diverse, synthetic chemicals that are persistent in the environment and tend to bioaccumulate. Most of these chemicals are banned in the U.S. Assessment of exposure to persistent organochlorines in a representative sample of the U.S. population is needed to determine current prevalence and level of exposure and the potential for human health threat from exposure to these chemicals.

### Eligible Sample

Participants aged 12 years of age and older.

### Data Collection Methods

Serum specimens are processed, stored, and shipped to the Division of Environmental Health Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention for analysis.

### Examination Protocol

Detailed specimen collection and processing instructions are discussed in the NHANES Laboratory/Medical Technologists Procedures Manual (LPM). Vials are stored under appropriate frozen (–20°C) conditions until they are shipped to National Center for Environmental Health for testing.

### Analytic Methodology

#### Substituted or Coplanar Polychlorinated Biphenyls (cPCBs), Other Polychlorinated Biphenyls (PCBs), Persistent Chlorinated Pesticides and Selected Pesticide Metabolites

These analytes are measured in serum by high-resolution gas chromatography/ isotope-dilution high-resolution mass spectrometry (HRGS/ID-HRMS). Serum samples are spiked with <sup>13</sup>C<sup>12</sup>-labeled internal standards and the analytes of interest are isolated using either a <sup>18</sup>C solid-phase extraction (SPE) or liquid-liquid extraction procedure followed by a multi-column automated cleanup and enrichment procedure. The analytes are chromatographed

on a DB-5 ms capillary column (30m x 0.25 mm x 0.25 µm film thickness) using a Hewlett-Packard 6890 gas chromatograph and selected analytes quantified by ID-HRMS using selected ion monitoring (SIM) at 10,000 resolving power using either a Micromass AutoSpec ULTIMA or Finnigan MAT95 mass spectrometer in the EI mode. The concentration of each analyte is calculated from an individual standard linear calibration. Each analytical run is conducted blinded and consists of three unknown serum samples, a method blank, and a quality control sample. Detection limits, on a whole-weight and lipid-adjusted basis, are reported for each sample, corrected for sample weight and analyte recovery.

## Analytic Notes

Measures of polychlorinated dibenzo-*p*-dioxins (PCDDs), dibenzofurans (PCDFs), non-ortho substituted or coplanar polychlorinated biphenyls (cPCBs), other polychlorinated biphenyls (PCBs), persistent chlorinated pesticides and selected pesticide metabolites are assessed in participants aged 12 years and older on a one-third subsample.

Use the special weights included in this data file when analyzing data. Read the “Special Sample Weights for this Dataset” information provided before beginning analysis.

## Detection limits

The detection limit was variable for all of the analytes in the data set. Two variables are provided for each of these analytes. The variable named LBD\_LC indicates whether the results was below the limit of detection. There are two values: “0” and “1”; “1” indicates that the result was below the limit of detection. The other variable named LBX\_ provides the analytic result for that analyte. In cases, where the result was below the limit of detection, the value for that variable is the detection limit divided by the square root of two.

## Special Sample Weights for this Dataset

Special sample weights are required to analyze these data properly. Measures of this urinary multi-analyte profile are assessed in participants aged 12 years and over on a randomly selected 1/3 subsample. Specific sample weights for this subsample are included in this data file and should be used when analyzing these data.

The dataset includes 2-year and 4-year subsample weights. The 4-year weights should be used if these 2001–2002 data are combined with 1999–2000 data. The 1999–2000 data files have been updated to include the subsample 4-year weights. The recommended procedure for variance estimation requires use of stratum and PSU variables (SDMVSTRA and SDMVPSU, respectively), which are included in the demographic data file for each data release. For further information, see the NHANES Analytic Guidelines, June 2004 version at: [http://www.cdc.gov/nchs/data/nhanes/nhanes\\_general\\_guidelines\\_june\\_04.pdf](http://www.cdc.gov/nchs/data/nhanes/nhanes_general_guidelines_june_04.pdf).

## References

### Cleanup and Mass Spectrometry

1. Patterson D.G. Jr., Holler J.S., Lapeza C.R., et al. High-Resolution Gas Chromatographic/High-Resolution Mass Spectroscopic Analysis of Human Adipose Tissue for 2,3,7,8-TCDD. *Anal. Chem.* 58:705–713 (1986).

2. Lapeza C.R. Jr., Patterson D.G. Jr., Liddle J.A.. An Automated Apparatus for the Extraction and Enrichment of 2,3,7,8-TCDD in Human Adipose. *Anal. Chem.* 58:713-716 (1986).
3. Patterson D.G. Jr., Holler J.S., Belser W.T., Boozer E.L., Lapeza C.R. Jr., Needham L.L. Determination of 2,3,7,8-TCDD in Human Adipose Tissue on Whole Weight and Lipid Bases. *Chemosphere*16:935–936 (1987).
4. Patterson D.G. Jr., Hampton L., Lapeza C.R. Jr., et al. High-Resolution Gas Chromatographic/High-Resolution Mass Spectrometric Analysis of Human Serum on A Whole-Weight and Lipid Basis for 2,3,7,8-TCDD. *Anal. Chem.* 59: 2000–2005 (1987).
5. Patterson D.G. Jr., Alexander L.R., Turner W.E., Isaacs S.G., and Needham L.L. (1990). The Development and Application of a High Resolution Mass Spectrometry Method for Measuring Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans in Serum. Chapter 9 In: *Instrumentation for Trace Organic Monitoring*. Clement R.E., Sui K.M., and Hill H.H. Jr., eds, Lewis Publishers.
6. Patterson D.G. Jr., Isaacs S.G., Alexander L.R., Turner W.E., Hampton L., Bernert J.T., Needham L.L. (1990). Determination of Specific Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans in Blood and Adipose Tissue by Isotope-Dilution High Resolution Mass Spectrometry, Method 5 in "Environmental Carcinogens - Methods of Analysis and Exposure Measurement. Volume 11 - Polychlorinated Dibenzo-*p*-dioxins, Dibenzofurans, and Biphenyls," C. Rappe and H.R. Buser, Eds., WHO, International Association for Research on Cancer, Lyon, France.
7. Turner W., DiPietro E., Cash T.P., McClure P.C., Patterson, D.G Jr., and Shir Khan H. An Improved SPE Extraction and Automated Sample Cleanup Method for Serum PCDDs, PCDFs, and Coplanar PCBs. *Organohalogen Compounds* 19: 31–35 (1994).
8. Turner W., DiPietro E., Lapeza C., Green V., Gill J., Patterson, D.G. , Jr. A Fast Universal Automated Cleanup System for the Isotope-Dilution High-Resolution Mass Spectrometric Analysis of PCDDs, PCDFs, Coplanar PCBs, PCB Congeners, and Persistent Pesticides from the Same Serum Sample. *Organohalogen Compounds.* 31:26–31 (1997).

#### **Quality Control and Limit of Detection**

9. Taylor J.K. Quality Assurance of Chemical Measurements. *Anal. Chem.* 53: 1588A-1592A, 1596A (1981).
10. Keith H.K., Crummett W., Deegan J. Jr., et al. Principles of Environmental Analysis. *Anal. Chem.* 55:2210–2218 (1983).
11. Keith L.H . Report Results Right, Part I. *Chemtech.* June: 352–356 (1991).
12. Keith L.H . Report Results Right, Part II. *Chemtech.* August: 486–489 (1991).

#### **Total Lipid Measurement**

13. Akins J.R., Waldrep K., and Bernert J.T. Jr. The Estimation of Total Serum Lipids by a Completely Enzymatic 'Summation' Method. *Clin. Chim. Acta.* 184: 219–226 (1989).

#### **Toxic Equivalency Factors (TEFs)**

14. Van den Berg M, Birnbaum L, Bosveld ATC et al. Toxic Equivalency Factors (TEFs) of PCBs, PCDDs, and PCDFs for Humans and Wildlife. *Environmental Health Perspectives*. 106:775–792 (1998).
15. Perspectives. 106:775–792 (1998).