

**Selected Persistent and Bioaccumulative Organic Pollutants in Human Placenta:
NCS Project 2-18**

Greater Chicago Study Center

July 29, 2011

R.M.A. Priyanthi S. Dassanayake, Jessica Nanes, Yulin Xia, An Li

Introduction: Lipophilic organic pollutants, e.g., polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs), dichlorodiphenyldichloroethylene (DDE), are capable of transferring through the placenta. To assess prenatal exposure to such chemicals, using placenta has remarkable advantages over cord blood. Not only is its collection non-invasive and trouble free, the bulky sample size provides sufficient tissue to allow the investigation of chemical synergy.

Method: To develop methods, placentae collected at the Ullinois were processed using matrix solid phase dispersion extraction and silica gel cleanup. Then, the concentrations of PCB/PBDE/DDE were analyzed by gas chromatography and tandem triple quadruple mass spectrometry with electron impact ionization.

Results and Discussions: In Figures 1/2, DDE was the most abundant compound found with 100% detection rate, and averaged at 323 (10 -1500) pg/g wet weight (wwt). The sum of 34 PCB congeners has a median of 378 pg/g wwt and an average of 2360 pg/g wwt. The most abundant congeners were CBs 138/77/153/118/101 (> 20 pg/g wwt). The data for all congeners are highly right-screwed, with the averages being 1.5 to 18 (average 6.6) times higher than medians. Analytical sensitivities were low for PBDEs compared to PCBs. For 34 mono- to hexa-BDEs, the sum Σ 34BDE in placenta has a median of 301 pg/g wwt and average of 310 pg/g wwt. BDE47 had the highest concentration followed by BDEs 99/28+33/100/153. These congeners were detected in almost all samples.

Conclusion: A validated method is now available to analyze placental tissue from the Pilot and Main Studies for NCS Project 2-18.

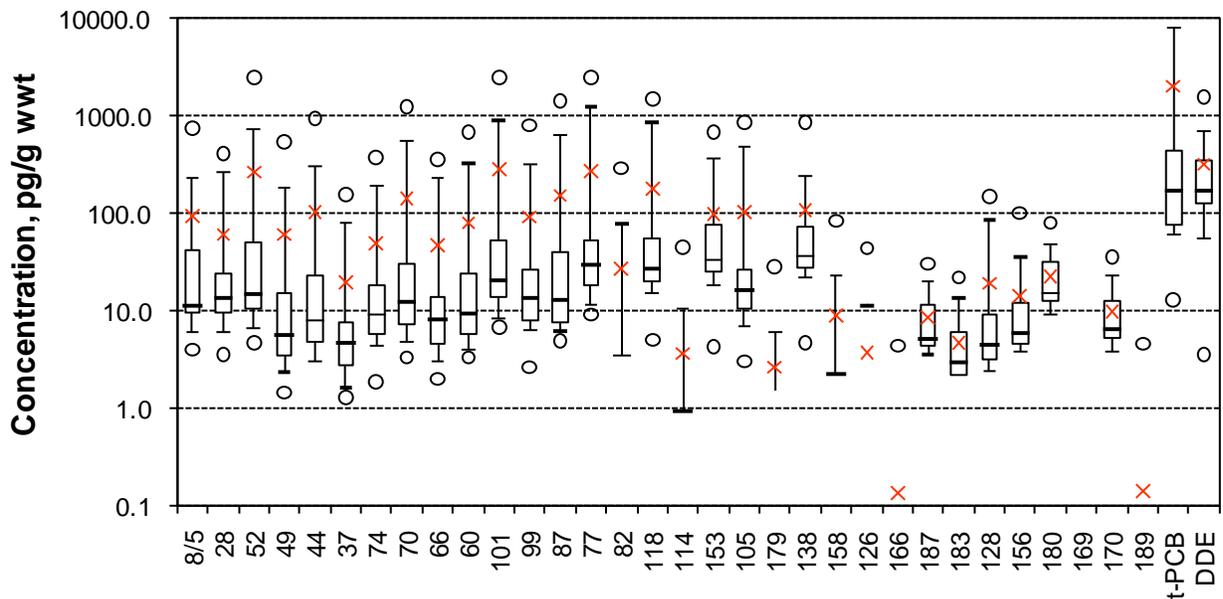


Figure 1. Boxplot of PCB and DDE concentrations in placenta. The box represents 25% to 75% percentiles with the bar inside representing the median the whiskers are 10% and 90% percentiles, and the circles are the minimum and maximum. The red cross is the average. t-PCB is the sum of all 34 congeners.

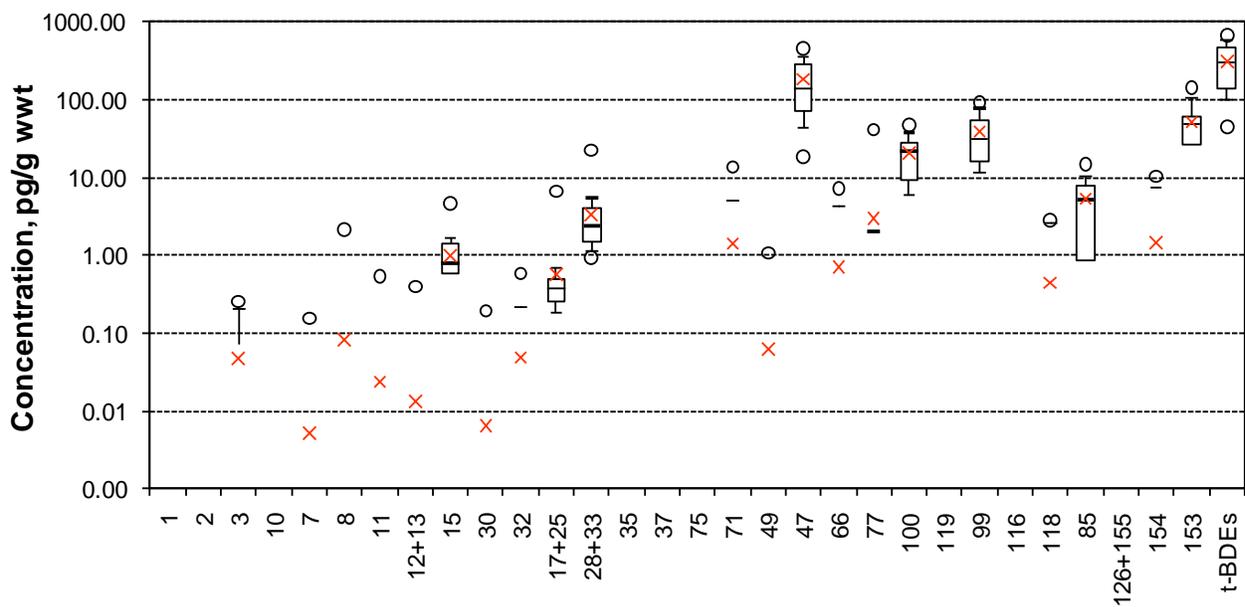


Figure 2. Boxplot of PBDE concentrations in placenta. The box represents 25% to 75% percentiles with the bar inside representing the median the whiskers are 10% and 90% percentiles, and the circles are the minimum and maximum. The red cross is the average. t-BDE is the sum of all 34 mono to hexa congeners.