REFERENCES FOR ENZYME-LINKED IMMUNOSORBENT ASSAY

Comparison of an enzyme-linked immunosorbent assay (ELISA) to gas chromatography (GC)--measurement of polychlorinated biphenyls (PCBs) in selected US fish extracts.

Chemosphere. 2000 Mar;40 (5):539-48.

Zajicek JL, Tillitt DE, Schwartz TR, Schmitt CJ, Harrison RO.

US Geological Survey, Columbia Environmental Research Center, MO 65201, USA.
james_zajicek@usgs.gov

The analysis of PCBs in fish tissues by immunoassay methods was evaluated using fish collected from a US monitoring program, the National Contaminant Biomonitoring Program of the US Department of Interior, Fish and Wildlife Service. Selected composite whole fish samples, which represented widely varying concentrations and sources of PCBs, were extracted and subjected to congener PCB analysis by gas chromatography (GC) and total PCB analysis using an ELISA (ePCBs) calibrated against technical Aroclor 1248. PCB congener patterns in these fishes were different from the patterns found in commercial Aroclors or their combinations as demonstrated by principal component analysis of normalized GC congener data. The sum of the PCB congeners measured by GC (total-PCBs) ranged from 37 to 4600 ng/g (wet weight). Concentrations of PCBs as determined by the ELISA method were positively correlated with total-PCBs and the ePCBs/total-PCBs ratios for individual samples ranged from 1 to 6. Ratios of ePCBs/total-PCBs for dilutions of Aroclors 1242, 1254, and 1260 and for matrix spikes range from 0.6 for 1242 to 2.5 for 1254 and 1260. These results suggest that higher chlorinated PCB congeners have higher affinity for the anti-PCB antibodies. Partial least squares with latent variable analysis of GC and ELISA data of selected Aroclors and fish samples also support the conclusion that ELISA derived PCB concentrations are dependent on the degree of chlorination.

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Direct competitive ELISA for the determination of polychlorinated biphenyls in soil samples.

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Deng AP, Kolar V, Ulrich R, Franek M.
Veterinary Research Institute, Hudcova 70, 621 32, Brno, Czech Republic.

A direct competitive ELISA for determination of polychlorinated biphenyls (PCB) in soil samples was described. The standard calibration curve based on Delor 103 (Aroclor 1242) was constructed in the dynamic range of 10-1000 micro g L(-1) and a detection limit of 5.0-12.9

micro g L(-1) (or 0.5-1.29 micro g g(-1) soil) was achieved. When spiked soil samples were extracted with methanol recoveries were 90.6-106.3 %. The effect of methanol and DMSO on assay signal and sensitivity was established. Eight PCB-contaminated soil samples were analyzed by ELISA and gas chromatography (GC). The ELISA results from Soxhlet extraction were in a good agreement with those of GC (correlation coefficient 0.9866; n=8). Except for one soil sample the results from ELISA with methanol extraction were not significantly different from those from GC.

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Prediction of *PCB* Content in Sportfish Using Semipermeable Membrane Devices (SPMDs).

Shim, S. M.[1,] Santerre, C. R.[1] santerre@purdue.edu., Dorworth, L. E.[2,] Miller, B. K.[3,] Stahl, J. R.[4,] Deardorff, D. C.[5]

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ENZYME-linked immunosorbent assay, FISHES, IMMUNOASSAY, IMMUNOENZYME technique, ORGANOCHLORINE compounds, POLYCHLORINATED biphenyls, PCB, ELISA, Fish, Contaminant, SPMD

Triolein-filled semipermeable membrane devices (SPMDs) were immersed at three locations along the St. Joseph River in northern Indiana for 30 days to see if the ***PCB*** content of fish from the same location could be predicted with this model device. Triolein from the SPMD's was analyzed for ***PCB*** using enzyme-linked immunosorbent assay (***ELISA***) and compared to residues detected in fish collected from the same locations. There was a significant difference ($p < 0.05$) in total ***PCB*** concentrations between SPMD samples. However, due to variability in ***PCB*** residues between species and low ***PCB*** residues in SPMDs, a direct correlation between ***PCBs*** in sportfish and SPMDs could not be determined. [*ABSTRACT FROM AUTHOR*]

Author Affiliations:[1]Department of Foods and Nutrition, Purdue University, West Lafayette, Indiana, USA
[2]Illinois-Indiana Sea Grant Program, Purdue University-Calumet, Hammond, Indiana, USA
[3]Illinois-Indiana Sea Grant Program, Purdue University, West Lafayette, Indiana, USA
[4]Indiana Department of Environmental Management, Indianapolis, Indiana, USA
[5]Strategic Diagnostics Inc., Newark, Delaware, USA

Immunoassay for polychlorinated biphenyls (PCB) using screen printed electrodes

Michele Del Carlo, Marco Mascini *
Dipartimento di Sanità Pubblica, Epidemiologia e Chimica Analitica Ambientale, Sezione di Chimica Analitica. Università di Firenze, Via G. Capponi 9, 50121 Firenze, Italia

Keywords: immunoassay, PCB, screen printed electrodes, ELISA, polyclonal antibodies

A disposable sensor for the detection of polychlorinated biphenyls (PCB) in soil samples has been developed using polyclonal antibodies as recognizing element and carbon-based screen printed electrochemical electrodes as sensing element. The analysis scheme has been based on the competitive enzyme linked immunosorbent assay (ELISA) protocol. The immunochemical reaction has been carried on using an Immobilon™ membrane as the solid phase. The enzyme used for the measurement of the immunoreaction has been alkaline phosphatase whereas the electrochemical substrate was α-naphthyl phosphate. The extent of the immunochemical reaction has been monitored by means of an electrochemical product using screen-printed electrodes and differential pulse voltammetry (DPV). The screen-printed electrodes were characterized and their electrochemical performance tested. Soil samples were assayed using a simple extraction kit. A detection limit of 0.3-0.6 ng/ml in solution was achieved with the proposed method regardless of PCB mixture standard. © 1999 John Wiley & Sons, Inc.

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*Correspondence to Marco Mascini, Dipartimento di Sanità Pubblica, Epidemiologia e Chimica Analitica Ambientale, Sezione di Chimica Analitica. Università di Firenze, Via G. Capponi 9, 50121 Firenze, Italia

Relative performance of immunochemical (enzyme-linked immunosorbent assay) and gas chromatography–electron-capture detection techniques to quantify polychlorinated biphenyls in mussel tissues

Gilberto Fillmann, , a, b, c, Tamara S. Gallowayc, Ross C. Sangerc, Michael H. Depledgec and James W. Readmanb

[a] Fundação Universidade Federal do Rio Grande, C.P. 474, Rio Grande, RS, Brazil, 96201-900
[b] Plymouth Marine Laboratory, Prospect Place, West Hoe, Plymouth PL1 3DH, UK
[c] Plymouth Environmental Research Centre, University of Plymouth, Drake Circus, Plymouth PL4 8AA, UK

Results from polychlorinated biphenyls (PCB) analyses of mussel tissue extracts by immunoassay (PCB RaPID Assay®) and conventional gas chromatography–electron-capture detection (GC–ECD) are described and compared. Mussels from natural populations with diverse concentrations of PCBs, mussel tissue fortified with technical Aroclor® 1254 and a certified reference material are included.

A strong correlation is reported between "total" PCBs quantified by both techniques (r^2=0.95, n=27). Immunoassay results, however, exhibited lower values compared to GC–ECD, particularly when GC results are corrected for procedural recovery. A reduced antibody response, due to differences in the congener composition between the mussel extracts and Aroclor® 1254 (used to raise and calibrate the ELISA), provides the most likely explanation for

this difference. Non-parametric statistical analyses confirmed that, although differing from Aroclor® 1254, PCB congener compositions in the mussel extracts most closely resemble that of Aroclor® 1254. At very high PCB concentrations (>30 μg g^{-1} dry weight), however, ELISA results are statistically different (P<0.01) from GC–ECD results, which is likely to be related to the solvation capacity of ELISA diluent. Similarity analysis showed high correlations between the most prominent congeners in Aroclor® 1254 and immunoassay results. This analysis did not, however, identify a specific chlorine substitution pattern to which the immunoassay preferentially responded.

Whilst GC–ECD affords the capability to quantify individual congeners of different reactivity and toxicity, the data reported do indicate that immunoassay offers a rapid and inexpensive alternative method for estimation of "total" PCBs at environmentally significant levels. It is, however, necessary to remove extraneous lipids to reduce matrix effects in the immunoassay.

Author Keywords**:** Immunoassay; ELISA; PCBs; Mussel; GC–ECD; Methodology

Analysis of soil and dust samples for polychlorinated biphenyls by enzyme-linked immunosorbent assay (ELISA)

Jane C. Chuanga, Larry S. Millera, Dave B. Davisa, Carole S. Pevena, Jeffre C. Johnsonb and Jeanette M. Van Emonb, *

[a] Battelle, 505 King Avenue Columbus, OH 43201 USA
[b] National Exposure Research Laboratory, US Environmental Protection Agency Las Vegas, NV 89193-3478 USA

An inhibition enzyme-linked immunosorbent assay (ELISA) was used to determine polychlorinated biphenyls (PCBs) in house dust and soil. Soil and house dust samples were analyzed for PCB by both gas chromatography/electron capture detection (GC/ECD) and ELISA methods. A correlation coefficient of 0.91 was obtained for the 41 soil samples. The correlation between the GC/ECD and the ELISA methods for the 10 house dust samples was not as good as that for the soil samples.

Author Keywords: ELISA; GC/ECD; PCB; Aroclor; House dust; Soil