

# Exposure Assessment Methods Development Pilots for the National Children's Study

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## Background

Accurate exposure classification tools are needed to link exposure with health effects. EPA began methods development pilot studies in 2000 to address general questions about exposures and outcome measures. Selected exposure pilot studies are highlighted below:



## Literature Review for Integrated Long-Term Sampling Methods

### Rationale:

- Snapshots, samples taken at a single point-in-time do not adequately describe exposure events; knowledge of exposure over time is needed.

### Approach:

- The focus of the review was on methods/instruments for exposure classification or long-term monitoring of chemicals in air, water, soil, dust. Chemical classes included VOCs, semivolatile organics, pesticides, and metals. The scope of the review included scientific literature, journals, Internet, trade publications, manufacturers literature.

### Results:

- The review provides information on matrix, method type, method performance, chemicals, detection limits, participant and field burden, and estimated analytical costs.



## Methods Advancement for Milk Analysis (MAMA)

### Objectives:

- To develop/evaluate methods for collection, preservation, storage, and analysis of human milk samples.
- To evaluate whether blood, saliva, and urine are useful surrogate media for the analysis of some constituents of milk.

### Approach:

- Using commercially available breast pumps; CDC collection containers and preservatives
- Conducting method verification and development studies with fresh and frozen human milk; CDC developing methods for chemical contaminants (e.g., Persistent Organic Pollutants)
- CDC comparing chemical measures in urine, saliva, and serum with values in milk
- Repeat samples are compared to determine clearance of exogenous milk components

### Results:

- Preliminary analyses determined the appropriate sample collection and preservation techniques; participant recruitment was best accomplished through office managers and nurses (in MD offices); have completed recruitment, and analyses are now underway.



## Demonstration of Low-Cost, Low-Burden, Exposure Monitoring Strategies for Use in the National Children's Study

### Objectives:

- Develop and demonstrate relevant, low-cost, low-burden exposure measurement strategies that can be used in a longitudinal epidemiological study.
- Demonstrate feasibility of remote data collection by study participants using available, easy to use measurements.
- Assess the participant burden and sample collection costs with these strategies.

### Approach:

- Readily-available and commonly used methods, instruments, and techniques were tested over a 12-month data collection period. Selected exposure data (environmental samples, biological samples, and survey data) were collected periodically from participants, who were enrolled from an existing Web-based panel. Instructions and sample collection media were sent to study participants who collected the samples, completed the forms, and sent the samples to the laboratory for analysis. Participants completed questionnaires and viewed instructions using a Web-TV system.

### Results:

- The pilot study demonstrated that study participants could effectively collect many types of simple environmental and biological samples, but had difficulty with more complex sampling methods. Packaging and return shipping was problematic for some types of samples.
- These studies provide National Children's Study researchers with low-cost alternatives to having technicians administer questionnaires and collect samples. Suggestions are provided for improving participant success in these procedures.



## Evaluation of Disposable Diapers for Measurements of Pesticide Metabolites and Creatinine in Urine

### Objective:

- To develop/evaluate a method using commercially available disposable diapers for collection of infant/toddler urine samples for quantitative measurements of metabolites (biomarkers) and creatinine.

### Approach:

- A laboratory study evaluated an extraction and analysis method for measuring metabolites of organophosphate and pyrethroid pesticides in urine samples collected with disposable diapers. The testing was performed in two phases:
  - an initial determination of the feasibility of the proposed solvent extraction and gas chromatography/mass spectrometry (GC/MS) analysis methods and
  - demonstration of the performance of the method (detection limits, accuracy, precision).

### Results:

- The tests demonstrated that disposable diapers can be used to collect urine samples for analysis of pesticide metabolites. The method had acceptable performance for metabolites of both classes of pesticides. Results showed that diapers could be stored for short time periods and shipped at ambient temperature without loss of the metabolites. The method may have widespread applications in studies with infants and toddlers for measuring exposures to pesticides and other chemicals.

