

National Biomonitoring Meeting Summary October 29, 2009

Background

Public health professionals, policymakers, and the public are increasingly concerned about human exposure to chemicals in our environment. While synthetic chemicals have dramatically improved our quality of life, their residues are widespread not only in consumer products but also in our water, soil, air and food.

This widespread environmental presence raises critical questions that need to be addressed. We need to determine the actual concentrations of dangerous chemicals in our bodies as a result of environmental exposure, how long these chemicals stay in our bodies, how often are we exposed to them at various stages of life, the ages at which significant exposures occur, which population groups have elevated exposures, and what relationship the presence of certain chemicals in our bodies has on the development of disease, abnormality, or death.

The Association of Public Health Laboratories (APHL) believes the best way to address these important questions regarding human exposure is through biomonitoring: a rigorous scientific process that measures levels of environmental chemicals in human tissues and fluids. While knowing what chemicals are present in the environment is important, it is even more important to determine whether they are actually present in the human body as a result of environmental exposure. Such data are essential to assessing relationships between chemical exposure and human health.

CDC's *National Report on Human Exposure to Environmental Chemicals* provides estimates of chemical exposures for the general U.S. population. Its current design does not allow calculation of exposure estimates on a state-by-state or city-by-city basis. For example, CDC cannot extract a subset of data and examine levels of blood lead that represent a state population. In order to produce such data, states need the capability and capacity to conduct biomonitoring assessments statewide or in communities or groups where chemical exposure is a concern.

In order to address this gap, APHL has developed a five year plan to establish a National Biomonitoring Network of public health laboratories (Appendix A). The goals will be (1) to investigate potential human exposures and associated environmental diseases and (2) to develop and enhance environmental health policies to minimize health risks, based on human exposure and toxicology information. This plan is an important first step since laboratories are an essential component of an effective national biomonitoring system. APHL recognizes that biomonitoring goes beyond the laboratory and that an effective national biomonitoring system requires the skills, expertise, and supporting infrastructure of a variety of additional entities and individuals.

The Meeting

On October 29th, APHL convened a broad range of stakeholders to explore the development of a national biomonitoring system. Specifically, the meeting goal was to

produce recommendations for a national biomonitoring system to enhance local, state and national capacity to utilize biomonitoring to develop sound public health policy and programs. The objectives of the meeting were as follows:

- Describe the essential functions and features of a national network of laboratories and the broader system within which it must function.
- Identify the contributors and users of a national biomonitoring system.
- Determine existing infrastructure and identify additional infrastructure needed.
- Identify key steps needed to create and support a national biomonitoring system.

The two opening presentations explained the impetus for the meeting and set the frame, and then participants broke out into small working groups. An agenda comprises Appendix B; the following is a summary of the small group work.

Benefits of a National Biomonitoring System

Participants were assigned to multi-disciplinary discussion groups to explore the potential benefits of a national biomonitoring system. In large part, the participants affirmed the draft definition and recommended minor changes (underlined text below):

A national biomonitoring system reflects the integration of the disciplines, technologies, and expertise needed to better utilize biomonitoring to:

- identify sources of exposure for a subset of chemicals
- *answer questions about chemical exposures and potential health effects*
- *respond to community concerns*
- *improve environmental health, public health, environmental and chemical policy.*

A national biomonitoring system will enable:

- *a more coordinated approach in the design and development of biomonitoring studies*
- *more effective use of limited resources*
- *higher quality data*
- *improved practice and data sharing.*

Additional benefits related to the following key themes:

- Advocating or promoting the use of biomonitoring and the need for investment at the local, state and national levels.
- Maximizing effective and efficient use of limited resources– through improved linkages and targeting research, policy and intervention.
- Enhancing coordination and communication across disciplines and agencies.
- Creating standards of practice to improve quality and enable sharing of data.
- Improving surveillance to identify populations at risk and chemicals of concern.
- Informing policy and program efforts at all levels of government.

Essential Functions of a National Biomonitoring System

Participants were tasked with articulating the primary functions of a national biomonitoring system: specifically identifying what a national biomonitoring system would be able to do? The following is the thematic summary of the groups' work:

- Surveillance: identify populations at potential risk and chemicals of concern in greater geo-spatial specificity.
- Quality Assurance: standardize methodology, ensure data quality and broaden availability of data.
- Identify gaps: identify gaps in knowledge and areas for future research, provide data for that research, produce actionable knowledge and information for public health intervention and policy.
- Collaboration: coordination across agencies and disciplines to effectively share information, resources and expertise.
- Communication: share information with external audiences regarding biomonitoring uses, results and limitations.
- Advocacy: share information to advocate for additional resources to support biomonitoring.
- Policy: make recommendations inform policy development and policy decisions.

Existing and Needed Infrastructure for a National Biomonitoring System

During the third part of the meeting, participants self-selected into discussion groups based on the functions identified in the previous discussions. The tasks were to: 1) identify the necessary infrastructure (physical, financial, human) to create and support a national biomonitoring system; and 2) determine which parts of the infrastructure exist, what needs enhancement and/or what needs to be created.

In all areas, participants noted the need for enhancement and creation of additional infrastructure. It is interesting to note the gaps in existing infrastructure for advocacy, interpretation and communication of biomonitoring results, standards/QA, and coordination across the existing infrastructure (e.g. national organizations).¹ Many of the biomonitoring programs in still in pilot phases and the funds and drivers for coordination and further quality assurance are lacking. However, participants believe this work is important to the success of a national biomonitoring system.

First Steps and Preliminary Strategies to Create and Support a National System

The meeting closed with individual identification of key steps needed to create and support a national biomonitoring system. A cluster of ideas emerged:

- Finalize the draft National Biomonitoring Plan for Public Health Laboratories.
- Create a meeting summary.
- Collaborate with partner organizations to develop best practices for laboratorians and other stakeholders.
- Continue communications among participants and disciplines.
- Build awareness and support for biomonitoring.
- Improve communication with the public.

¹ See Appendix C for table of infrastructure.

APPENDIX A:

**Draft National Biomonitoring Plan
for Public Health Laboratories**



National Biomonitoring Plan for Public Health Laboratories Five-Year Plan

Biomonitoring is a tool used to measure environmental chemicals in people's blood, urine, and other fluids. Throughout the world, biomonitoring is the standard for assessing people's exposure to chemicals and toxic substances, such as lead and pesticides. Biomonitoring also provides critical information for responding to public health problems involving chemicals. Federal, state and local health officials increasingly rely on biomonitoring data to make public health decisions. Advances in analytical chemistry enable scientists to measure low levels of environmental chemicals in people, but more research is needed to determine which levels cause health effects.

For at least three decades, CDC's Environmental Health Laboratory has used biomonitoring to provide critical data about the U.S. population's exposure to hundreds of environmental chemicals. These findings have been published in the peer-reviewed literature and in CDC's *National Report on Human Exposure to Environmental Chemicals*, an ongoing assessment of the exposure of the U.S. population to chemicals. CDC's Exposure Report provides estimates of exposure for the civilian, noninstitutionalized U.S. population. The current survey design does not allow calculation of exposure estimates on a state-by-state or city-by-city basis. For example, CDC cannot extract a subset of data and examine levels of blood lead that represent a state population. In order to produce such data, states need the capability and capacity to conduct biomonitoring assessments statewide or in communities or groups where chemical exposure is a concern. State biomonitoring programs can produce state- or community-specific exposure data that can be compared to results in CDC's Exposure Report. Such comparisons will show whether a person or a group has an unusually high exposure compared to the rest of the U.S. population.

Vision

To improve the health of the Nation through biomonitoring.

Our vision is to have a network of public health laboratory biomonitoring programs at the national, state and local levels able to respond to environmental health concerns.

Mission

To provide accurate human exposure data that will inform important public health decisions.

Federal, state, and local health officials increasingly rely on scientific data to make public health decisions. Arming them with accurate human exposure data relevant to specific populations will empower them to make better decisions and to develop policies to better protect the public's health.

Guiding Principles

The development and implementation of this National Biomonitoring Plan will be guided by the following principles:

1. The process for developing and implementing a national plan and its related activities will be highly collaborative by including feedback from key stakeholders.
2. The Plan and related activities will also include relevant contextual information to promote appropriate use and interpretation of human exposure data.
3. This plan builds on existing activities in the field of biomonitoring and is meant to provide a coordinated national approach to addressing public health issues related to chemical exposures.
4. The guidance developed to support the plan will reflect scientific norms and standards where feasible in order to enable benchmarking and comparisons across studies.
5. Laboratory science will remain the focus of this plan. We recognize that success in this focus requires contributions from other important public health program areas and so there will be an organized feedback process to develop and implement this plan.

Goals

1) Develop a National Biomonitoring Network

Using biomonitoring data from a network of federal, state and local laboratories will better inform public officials as they develop and evaluate effective public health interventions that protect the public's health from exposure to harmful chemicals.

2) Foster Collaboration Among Environmental Public Health Programs

Agencies, organizations and entities with a vested interest in biomonitoring will accelerate the impact of the network. Strengthening these partnerships will enable the design and implementation of sound exposure studies and provide credible biomonitoring data to inform public health decisions.

3) Disseminate Biomonitoring Information to Guide Policy and Practice

Federal, state and local public health practitioners, healthcare providers, policymakers and others will gain a better understanding of what biomonitoring is, how this tool can be used and what actions can be taken to reduce potentially harmful exposures. Developing and disseminating materials that explain how to comprehend, interpret and apply biomonitoring information will raise awareness and increase fundamental understanding of the complex information being communicated, especially when findings are uncertain and when information is limited.

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Goals (cont'd)**4) Advance Biomonitoring Science and Research**

Conducting sound biomonitoring studies is critical to the success of a national network. Adopting scientific principles and sound methodology to meet the needs of state-based biomonitoring programs will lead to generation of useful and scientifically defensible population exposure data.

5) Enhance Biomonitoring Workforce and Infrastructure

Improving infrastructure and developing the workforce will ensure that essential services are provided for addressing concerns about existing and emerging environmental chemicals. Sustainability of the network depends on the availability of trained workforce, adequate laboratory infrastructure and equipment and sound quality assurance systems.

Goal 1: Develop a National Biomonitoring Network

Using biomonitoring data from a network of federal, state and local laboratories will better inform public officials as they develop and evaluate effective public health interventions that protect the public's health from chemicals of concern.

Objective 1.1: Ensure that resources to develop biomonitoring capacity and capability is available to all interested States.

APHL:

Activity 1.1.1: Drafts guidance for laboratories interested in establishing biomonitoring programs, including how to develop a research agenda.

Activity 1.1.2: Produces a draft plan identifying goals and objectives for building a National Biomonitoring Network.

Activity 1.1.3: Holds stakeholder meeting to develop recommendations for creating a national biomonitoring system.

Activity 1.1.4: Proposes models for a National Biomonitoring Network (e.g., regional labs, LRN-C model, each State establishing its own program).

Activity 1.1.5: Establishes a clearinghouse of: a) current biomonitoring methods and capacities; b) biomonitoring studies conducted by communities and States; and c) relevant state and federal biomonitoring legislation .

Objective 1.2: Build capacity at the state and national level.

APHL:

Activity 1.2. 1: Educates policymakers about the benefits of biomonitoring and the need to support programs at the national and state levels.

Activity 1.2.2: Works with the National Conference of State Legislatures (NCSL) to develop best practices for state biomonitoring legislation.

CDC:

Activity 1.2.3: Funds three state-based biomonitoring programs.

- Establishes a training program for funded states.
- Develops a quality assurance program for biomonitoring measurements.
- Evaluates experiences and effectiveness of funded programs and states.

Activity 1.2.4: Supports additional states as funding becomes available.²

Goal 2: Foster Collaboration Among Environmental Public Health Programs

Agencies, organizations and entities with a vested interest in biomonitoring will accelerate the impact of the network. Strengthening these partnerships will enable increased use of biomonitoring data to inform public health decisions.

Objective 2.1: Create opportunities for stakeholders to relay relevant information and challenges for biomonitoring.

APHL:

Activity 2.1.1: Coordinates with CSTE and CDC to organize a session on biomonitoring and best practices at the APHL Annual Meeting in June 2010.

CDC:

Activity 2.1.2: Ensures biomonitoring is a component of the National Conversation on Public Health and Chemical Exposures.

Objective 2.2: Compile existing, and develop new resources for laboratorians to learn about basic epidemiology, toxicology study design, and protection of human subjects.

APHL:

Activity 2.2.1: Collaborates with CDC and EPA to identify methods for sharing existing toxicology data.

Activity 2.2.2: Coordinates with CSTE and ASPH to develop and disseminate basic epidemiology and toxicology training courses that focus on using biomonitoring as a component of studies.

² Note that all activities in this Plan depend upon funding.

Objective 2.3: Compile existing, and develop new, resources for non-laboratorians to learn about laboratory principles and methods related to biomonitoring.

APHL:

Activity 2.3.1: Collaborates with CSTE, ASTHO and ASPH to develop a “biomonitoring 101” session for non-laboratorians.

Activity 2.3.2: Work with CSTE and ASTHO to present “biomonitoring 101” session at the CSTE and ASTHO annual meetings.

Goal 3: Disseminate Biomonitoring Information to Guide Policy and Practice

Federal, state and local public health practitioners, healthcare providers, policymakers and others will gain a better understanding of what biomonitoring is, how this tool can be used and what actions can be taken to reduce potentially harmful exposures within populations. Developing and disseminating materials that explain how to interpret, communicate and apply biomonitoring information will raise awareness and increase fundamental understanding of the complex information, especially when findings are uncertain and when information is insufficient.

Objective 3.1: Develop information to assist in communicating biomonitoring findings to different audiences.

CDC:

Activity 3.1.1: Conducts formative research on communicating biomonitoring data to different audiences and makes findings available through publications and conference presentations.

Objective 3.2: Increase understanding of what biomonitoring is to both the public health community and general population.

APHL:

Activity 3.2.1: Publishes a summary of biomonitoring efforts within state and local laboratories and disseminate summary to policymakers at the national and state levels.

Activity 3.2.2: Coordinates with NCSL to organize a “biomonitoring in action” session at a NCSL national meeting highlighting how biomonitoring solves public health problems for states.

CDC:

Activity 3.2.3: Continues publishing the *National Report on Human Exposure to Environmental Chemicals* (Exposure Report,) and presents findings from the Exposure Report at the APHL National Meeting “best practices” session

Activity 3.2.4: Highlights biomonitoring uses within the workgroups of the National Conversation on Public Health and Chemical Exposures.

Activity 3.2.5: Disseminates information on the benefits and uses of biomonitoring to internal stakeholder (HHS, OMB) and to sister agencies (EPA, FDA, NIH and USGS.)

Goal 4: Advance Biomonitoring Science and Research

Conducting sound biomonitoring studies is critical to the success of a national network. Enhancing the science to meet environmental health, public policy and research needs, particularly for state- and community-based programs, will build on the existing body of knowledge and strengthen new and existing programs.

Objective 4.1: Support state laboratory efforts to adapt and improve existing testing methods and to develop new methods for emerging contaminants.

APHL:

Activity 4.1.1: Develops a database of available biomonitoring resources at the state laboratory level.

CDC:

Activity 4.1.2: Presents data on new methods for emerging contaminants at conference such as the APHL Annual Meeting.

Objective 4.2: Develop trainings, guidelines and best practices to ensure biomonitoring studies are appropriately designed and implemented, including the assurance of appropriate levels of human subject protection.

Goal 5: Enhance Biomonitoring Workforce and Infrastructure

Improving infrastructure and developing the workforce will ensure that essential services are provided for addressing concerns about existing and emerging environmental chemicals. Sustainability of the network depends on a trained workforce and adequate equipment, data and tools to produce robust results.

Objective 5.1: Address informatics needs:

Activity 5.1.1: Determine minimal and optimal infrastructure requirements for biomonitoring programs.

Activity 5.1.2: Determine minimal laboratory staffing and equipment needs

Activity 5.1.3: Develop a framework for data exchange.

Objective 5.2: Build biomonitoring expertise through workforce development.

APHL:

Activity 5.2.1: Facilitates, designs, and distributes training courses and materials.

Objective 5.3: Assess implementation of this plan.

APHL:

Activity 5.3.1: Conducts a 50-state survey on progress of biomonitoring.

Activity 5.3.2: Works with CDC to review and update plan activities on an annual basis.

Questions or comments on the National Biomonitoring Plan for Public Health Laboratories?

Email Jennifer Pierson at jennifer.pierson@aphl.org

APPENDIX B:
National Biomonitoring Meeting
Agenda
October 29, 2009

National Biomonitoring Meeting

Sheraton Atlanta Hotel, Athens Room

Goal:

Produce recommendations for a national biomonitoring system to enhance local, state and national capacity to utilize biomonitoring to develop sound public health policy and programs.

Objectives:

- ✦ Describe the essential functions and features of a national network laboratory and the national biomonitoring system within which it must function.
- ✦ Identify the contributors and users of a national biomonitoring system.
- ✦ Determine existing infrastructure and identify additional infrastructure needed.
- ✦ Identify key steps needed to create and support not only a national network of laboratories but also a national biomonitoring system.

Draft Agenda:

- | | |
|--------------|---|
| 7:30 | Registration and Coffee |
| 8:00 | Welcoming Remarks and Agenda Review |
| 8:45 | Call for a National Biomonitoring System:
<i>Tom Burke, PhD, MPH, Johns Hopkins School of Public Health</i> |
| 9:30 | The APHL Plan for a National Biomonitoring Network of Laboratories |
| 9:45 | The Proposed APHL Network as Part of a National Biomonitoring System
<i>Small group work session</i> |
| 10:45 | Morning Break |
| 11:00 | Essential Functions of a National Biomonitoring System
<i>Small group work session</i> |
| 12:00 | Lunch (<i>provided</i>) |
| 12:45 | Existing and Needed Infrastructure for a National Biomonitoring System
<i>Small group work session</i> |
| 1:45 | Necessary Steps and Preliminary Strategies to Create and Support a National System |
| 2:45 | Closing Remarks |
| 3:00 | Adjourn |

This meeting is supported under Cooperative Agreement #U60/CCU303019 between the Centers for Disease Control and Prevention, National Center for Environmental Health and the Association of Public Health Laboratories.



OCTOBER 29, 2000 Atlanta, Georgia

APPENDIX C:

Existing and Needed Infrastructure for a National Biomonitoring System

Existing and Needed Infrastructure for a National Biomonitoring System

	Exist	Enhance	Create
Surveillance			
Lab space, equipment, freezers, warranties, instrumentation	X	X	X
Reagents, standards, QA/QC		X	X
protocols for shipping, storage, aliquots, methods, sample, survey etc		X	X
Databases: storage, bar-coding, data mining/analysis, survey	X	X	
Framework to communicate with participants and stakeholders			X
Confidentiality/ security		X	
Fellows, training, on-the-job training, recruitment	X	X	
Community outreach, health educators, health literacy and translators		X	
Study coordinators		X	
Funding	X	X	X
survey/sampling methods (in field)		X	
Advocacy			
Two-way communication channel			X
Legislation		X	
Best practices for legislation			X
Mechanism for capturing success stories		X	X
Network of scientific and PH advocates to act as spokes-people			X
Biomonitoring Advocacy 101			X
Coordination			
Coordination Council			X
Professional organizations involvement	X	X	
National/ regional, local meetings	X	X	
Coordinate with tracking		X	X
Standards, regulatory, IRB, CLIA	X	X	
Cross-discipline training		X	X
Funding	X	X	X
Communication and education	X	X	X
Research			
Identify unknowns in lab	X	X	
Tox and Epi experts analyze data	X	X	X
Access to chemical production information			X
Environmental exposure analyses		X	

Existing and Needed Infrastructure for a National Biomonitoring System

	Exist	Enhance	Create
Communication			
Reference range generation from state and CDC labs		X	X
Interpretative guidance		X	X
Website to access data (CDC and regional networks)		X	X
Standards/QA			
Methods, equip other	X	X	X
Proficiency testing		X	X
Sustainable, educated and trained staff	X	X	X
Standard materials			X
Standard collection procedures, preserving and storage and transport		X	X
Standard training			X
Method validation		X	X
Gap analysis to identify current resources			X
Meetings/forums to bring stakeholders together			X
Policy			
APHL policy (program) staff	X		
TSCA policy reform (assay development, biomonitoring requirement)		X	X
Privacy policies (informed consent, ethics)		X	X
Common data elements			X