

BIOMONITORING WORKSHOP SUMMARY

Understanding Human Biomonitoring:

McLaughlin Centre for Population Health Risk Assessment
University of Ottawa, Senate Room
Ottawa, Ontario, Canada

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This Summary is based on presentations and discussions held at the 2006 "Understanding Human Biomonitoring Workshop", and represents the collective views and key messages of speakers, panel members and workshop participants including U.S. National Research Council committee members, governmental organizations, academics, non-governmental organizations, industry representatives from Canada and the United States. The objective of the Workshop was to "Increase the understanding of human biomonitoring and the importance of robust study designs, scientifically sound interpretation of results and effective communication of new results".

This Summary represents the main messages of the morning speakers' and panel members' presentations and the afternoon group discussion session. Additional information including the final report of the Workshop, the PowerPoint presentations from the morning speakers and panel members and the Biomonitoring Workshop participants are available for reference www.mclaughlincentre.ca. The summary was prepared by the Workshop organizing committee.

Key Concepts & Messages In Understanding Human Biomonitoring

Workshop Summary

What is Human Biomonitoring?

- Recent advances in analytical chemistry allow us to better detect both natural and synthetic substances in human tissues through an advanced technology called biomonitoring. This promising public health tool can help us better understand human exposure to a wide range of substances.
- Biomonitoring is defined as one method for assessing human exposure to chemicals by measuring the chemicals or their metabolites in human tissues or specimens, such as blood or urine (CDC 2005).

Role of Human Biomonitoring

- Biomonitoring has identified and confirmed human exposure to environmental substances, such as the presence of lead in children's blood.
- Biomonitoring can be applied in various ways, including evaluation of the presence of chemicals in body tissues, and to track spatial variation and temporal trends in chemical exposure.
- Biomonitoring may also be helpful in identifying at-risk populations.

Ethical Issues

- The objectives and hypotheses of biomonitoring studies must be clearly stated at the outset in order to identify ethical issues.
- Careful consideration needs to be given to confidentiality, informed consent, reporting of results, and public-health or clinical follow-up.

Interpretation of Biomonitoring Data

- The U.S. National Research Council identifies several ways in which biomonitoring data can be used in assessing potential human health risks from exposure to environmental chemicals¹.
- As noted by the U.S. Centers for Disease Control², human biomonitoring data requires careful interpretation. In particular, the presence of an environmental chemical in a person's blood or urine does not by itself mean that the chemical causes disease.

1 <http://www.nap.edu/catalog/11700.html>

2 <http://www.cdc.gov/exposurereport/3rd/>

Challenges in Communicating Biomonitoring Data

- A communication plan should be established at the time a biomonitoring study is initiated.
- Two-way communication through an open and transparent process is important in the discussion of biomonitoring data.
- A recommendation of the recent U.S. National Research Council report on Human Biomonitoring for Environmental Chemicals is to use individual, community, and population-based strategies for communicating the results of biomonitoring studies.

Biomonitoring of Environmental Chemicals at Health Canada

- Biomonitoring at Health Canada encompasses a range of activities, including the collection of biomonitoring data on population subgroups such as pregnant women and First Nations and Northern populations.
- Beginning in 2007, the Canadian Health Measures Survey (CHMS) will include a substantial biomonitoring component, with biomonitoring data collected on 5,000 Canadians 6-79 years of age.
- The selection criteria for environmental chemicals to be measured in the CHMS included public health concerns, evidence of potential population exposures, regulatory and health program needs, respondent burden, consistency with surveys in other countries, availability of valid laboratory analytical methods, and cost.
- The objectives of the CHMS biomonitoring component are to establish current population-representative levels for a range of environmental chemicals, to provide a baseline for assessing emerging trends, and to allow comparisons of data from other sub-populations and geographic regions in Canada, and with other countries.

Types of Biomarkers

- The Centers for Disease Control has presented an 'exposure-effect continuum' that includes biomarkers of exposure, susceptibility, and biological change*.
- The U.S. National Research Council has developed a framework for the use and selection of different types of biomarkers. This framework is helpful in understanding the strengths and limitations of various biomarkers based on the scientific knowledge we have about them.

*The 'exposure-effect continuum' is described in more detail in the presentation given by Dr. Dana Barr, available in the workshop proceedings and in Figure1, and was initially proposed by NRC (National Research Council). 1987. **Biologic markers in environmental health research. Environ Health Perspect. 74:3-9.**

Conclusions

- Human biomonitoring is a tool with great potential to contribute to our understanding of human exposure to environmental substances.
- There is a need for consideration of ethical issues relating to the collection of human tissues for biomonitoring purposes at all stages of a biomonitoring program.
- Effective communication is among the biggest challenges in biomonitoring.
- Research is needed to support the interpretation of biomonitoring results.
- It is critical that biomonitoring study designs be carefully constructed in order to ensure that informative biomonitoring results be obtained

Biomonitoring! What Happens Next?

- The U.S. National Research Council report on "Human Biomonitoring of Environmental Chemicals" provides a framework for more effective implementation of biomonitoring.
- Collection of new biomonitoring data like the Canadian Health Measures Survey will provide needed direction for evaluating exposures to environmental substances in Canada.
- Internationally, biomonitoring data, such as that collected by CDC in the United States, will also be valuable in assessing human exposures to environmental substances.

Figure 1: Source: Presentation of Dr. Dana Barr, CDC

