

Biomonitoring

What Is Biomonitoring?

Biomonitoring is the laboratory analysis of blood, urine, serum, saliva, and other body fluids to identify the burden of certain chemicals present in the human body.

Biomonitoring allows us to recognize the populations that are exposed to and potentially affected by chemicals in the environment. When combined with a nationwide system for tracking chronic diseases, biomonitoring can provide the information necessary for public health departments, health care providers, and policymakers to identify and address public health threats.

How Does Biomonitoring Currently Take Place?

The Centers for Disease Control and Prevention (CDC) National Center for Health Statistics (NCHS) currently conducts its biomonitoring program through the National Health and Nutrition Examination Survey (NHANES). NHANES is an annual, cross-sectional, representative survey designed to collect information about the health and diet of the civilian, non-institutionalized population of the United States. NHANES samples about 5,000 people every year through a Mobile Examination Center that travels around the country to randomly selected households. The Center is staffed by medical professionals who conduct interviews and physical examinations on study participants. Extensive laboratory testing of participants' body fluids is also conducted. For more information on NHANES methodology and results, please visit www.cdc.gov/nchs/nhanes.htm.

In 1999, the NHANES added 27 chemicals to its laboratory analysis, providing information on the magnitude and extent of population exposure to these specific environmental contaminants in air, water, soil and food. The following year, the number of chemicals examined by the NHANES was expanded to 116. In future years, CDC aims to add an additional 25 chemicals each year to the survey.

Although the NHANES is a valuable source of information for environmental health, the study has limitations that include:

- A limited number of chemicals;
- Limited geographic coverage, allowing only national conclusions to be made from the available data. There is not enough data concentrated in a geographic area to make conclusions about environmental exposures on state or local levels;
- Lack of translation of science to action. The study is not associated with ongoing health surveillance that could link confirmed human exposures to known environmental hazards.

The National Exposure Report: Understanding the Relationship between Chemicals and the Human Body

The expanded NHANES biomonitoring data, although still limited, provided the information for CDC's second *National Report on Human Exposure to Environmental Chemicals*, published in January 2003. The report can be accessed at www.cdc.gov/exposurereport. The publication of this report was an important step toward developing the link between the environment and chronic disease. However, it remains a "snapshot" and provides only a baseline measurement of the American public's exposure to some common pollutants in the environment. Future studies will provide a comparison and trend information for the 116 chemicals and, as additional chemicals are added, our knowledge will continue to increase.

It is important to recognize that information gathered on chemicals in the human body, such as the data provided by the NHANES study, is only one piece of the puzzle. There are many chemicals for which we have little or no information regarding long-term chronic health effects. The nation still has an incomplete picture of the types and levels of various chemical contaminants in our food, water and air. We need to learn more about the chemicals in our surrounding environment: how they are metabolized and stored by the human body and how they interact with external factors such as food items and medications. This information is important for all Americans, but of particular importance to those populations who may be more vulnerable to the effects of certain chemicals. These include infants, young children and pregnant women.

How Does Biomonitoring Relate To A Chronic Disease Monitoring and Tracking Network?

Biomonitoring constitutes an important part of the nationwide chronic disease monitoring and tracking network needed by the United States. It confirms that an exposure has occurred and that varying amounts of toxins are present in the human body. This data must be overlaid with current hazard tracking done by the EPA and the clinical tracking of incidence and prevalence of chronic diseases and conditions. Only when all of the information is complete can we systematically identify and analyze the relationships between human exposure to environmental hazards and the incidence and prevalence of certain diseases and conditions in that same population.