



## **Biomonitoring and Chemistry**

**Biomonitoring is a powerful tool that helps scientists, physicians, and public health officials better understand human exposure to environmental substances.**

- The human body is made of thousands of chemical substances, many of which – vitamins, nutrients, proteins and hormones – are essential to life. While some of these chemicals are generated within our bodies, others are absorbed by eating, breathing, and through contact with our surroundings.
- Throughout our lives, humans and other organisms are continually exposed to environmental substances, both naturally occurring (from air, water and soil or produced by plants, animals and natural events, such as forest fires and volcanoes) and manmade (pharmaceuticals, soaps, disinfectants, etc.)
- While scientists have long understood that our bodies absorb tiny amounts of these substances simply by interacting with our environments, today's technology allows researchers to detect and measure trace concentrations of increasing numbers of substances in human milk, blood, urine and tissues. This field of research is known as biomonitoring.
- Biomonitoring data play an important role in helping scientists better understand human exposure to both naturally occurring and manmade substances. And as biomonitoring technology continues to advance, more information is being made available to help scientists, medical professionals and policy makers enhance public health.

**From clean drinking water to life-saving vaccines, chemistry and the products of chemistry play a critical role in protecting and advancing public health.**

- The manufacturers of chemical products work hand-in-hand with government agencies and the scientific community to advance knowledge about the safety of our products so that we can continue to deliver innovation that enhances human health and the quality of our lives.
- In some instances, substances that contribute to our improving health and quality of life have also become a small but measurable component of our environment.
- For more than 30 years, a combination of regulatory controls, voluntary programs and continuously improving technologies in the U.S. have been very effective in reducing human exposure to substances involved in manufacturing these products. Even so, today's advanced technology allows the detection of smaller and smaller amounts of substances in humans and the environment.

**Because better information is the key to better decisions, it's important to communicate the results and limitations of biomonitoring studies in a way that is meaningful to the lay person.**

- The detection of a substance in the body indicates only that an exposure has taken place; it does not indicate whether an exposure has resulted in any adverse health effect. This point is underscored by the Centers for Disease Control and Prevention (CDC), "Just because people have an environmental chemical in their blood or urine does not mean that the chemical causes disease<sup>1</sup>."

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- In large enough quantities, virtually any natural or manmade substance can be harmful to human health. However, current levels of most environmental chemicals detected in the U.S. population are generally thought to be well below those considered to be associated with adverse effects<sup>2</sup>.
- Biomonitoring data do *not* provide information about (1) the source(s) of an exposure, (2) how long a substance has been in the body, or (3) what effect, if any, a substance may have on human health. However, biomonitoring data *do* provide guidance for conducting additional scientific research.
- Biomonitoring data continue to confirm that pollution controls have been effective in reducing human exposure to many potentially harmful substances, such as lead and mercury.
- As biomonitoring technology continues to progress, scientists are able to detect greater numbers of chemical substances and to measure them at smaller and smaller concentrations in the body. Thus, the measurement and reporting of a particular chemical in human samples for the first time does *not* mean that the chemical is new to our bodies or that levels of exposure are increasing. Often, it simply means that scientists have developed better analytical methods for studying human exposures.

**Together with government and the scientific community, the chemical industry is actively engaged in efforts to better understand the complex relationship between modern chemistry and human health.**

- Understanding the potential effects of our environment – including the wide array of physical, biological, social, behavioral and chemical factors that can have both positive and negative effects on human health – is incredibly complex.
- Scientists and medical professionals across government, academia and industry understand that biomonitoring data are difficult to interpret without related research (e.g., toxicity testing, epidemiology research, exposure measurements, etc.) to characterize potential health effects.
- The chemical industry is currently engaged with the government and the scientific community to help further characterize the potential health effects associated with the majority of chemical products in commerce today. Information on individual chemical substances is submitted to the U.S. Environmental Protection Agency and made available to the public on-line at: <http://www.epa.gov/chemrtk/>.
- Over time, biomonitoring research will allow scientists to study trends in human exposure and to compare biomonitoring data among subpopulations.
- The chemical industry is optimistic that advances in biomonitoring and related research offer great promise in the effort to protect and enhance human health.

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<sup>1</sup> Centers for Disease Control and Prevention. Second National Report on Human Exposure to Environmental Chemicals. CDC; 2003. p.2.

<sup>2</sup> American Council on Science and Health. *Traces of Environmental Chemicals in the Human Body: Are They a Risk to Health*. New York, NY; ACSH; 2003, p. 5-6.

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