

Executive Summary

Biomonitoring — the measurement of chemicals or their metabolites in a person’s body — can provide an overall measure of human exposure to certain chemicals found in air, water, food, soil, dust, and consumer products. Biomonitoring helps us track the amounts and types of chemicals that get into people from all sources.

Background

The California Environmental Contaminant Biomonitoring Program (the Program) was established through legislation in 2006 by Senate Bill 1379 (Perata) and codified in Health & Safety Code Sections 105440 et seq. Also known as Biomonitoring California, the Program is a collaborative effort involving the California Department of Public Health (CDPH) as the lead, with the Office of Environmental Health Hazard Assessment and the Department of Toxic Substances Control. It receives technical advice and peer review from a Scientific Guidance Panel and input from the public.

The Program is required to submit progress reports every two years to the Legislature. This document is the third such report. The first two reports can be accessed at: www.biomonitoring.ca.gov/biomonitoring-california-reports. For more information about Biomonitoring California, visit the Program website at: www.biomonitoring.ca.gov/.

This report includes information on program deliverables for the time period between January 1, 2012 and December 31, 2013. The report also includes current financial information.

New Biomonitoring California Results and Other Program Highlights

In establishing the Biomonitoring California program, the Legislature found that biomonitoring can “provide data that will help California scientists, researchers, public health personnel, and community members explore linkages between chemical exposures and health.” The Legislature envisioned that the data would be collected in scientifically-based statewide surveys, as well as community-based surveys, contingent on resources. As described in the following sections, Biomonitoring California is undertaking a number of smaller-scale projects that in themselves will provide valuable information and will also establish a strong foundation for statewide surveys in the future. Biomonitoring California has focused to date on building laboratory capabilities, developing techniques to appropriately communicate results of individual tests to participants (as required by the statute), and engaging in a series of scientifically-based targeted studies of vulnerable subpopulations. We have been able to compare the results from our targeted studies with data from national surveys, providing valuable information about exposures in some California subpopulations. By leveraging available state and federal funding and building partnerships with university researchers and other expert scientists, Biomonitoring California has succeeded in building a robust program with the ability to measure nearly 140 priority chemicals in Californians.

Biomonitoring will play a key role in assessing the effectiveness of recent measures to reduce specific chemical exposures, and in helping to inform the state’s efforts to identify and regulate chemicals of concern in consumer products.

To date, we have pursued three full project collaborations and eight laboratory collaborations, including participants from a wide range of California populations. The Program has completed two of the three full collaborative projects:

- The Maternal and Infant Environmental Exposure Project (MIEEP), a study of 92 pregnant mothers and their infants in San Francisco, is complete.
- The Firefighter Occupational Exposures Project (FOX), a study of 101 firefighters in Southern California, is complete.
- The Biomonitoring Exposure Study (BEST), a study of more than 500 adult residents of the Central Valley, has completed recruitment, and sample analyses are partially complete.

Biomonitoring California's key findings to date are:

- Infants in MIEEP had higher levels of certain chemicals as compared with their mothers, including PBDE flame retardants that have been banned in California due to health concerns. Of the 59 chemicals analyzed both in pregnant mothers and their infants, 50 were detected.
- High levels of PBDE flame retardants were found in Southern California firefighters, compared with the general U.S. population and with other subgroups in California. Levels were especially high in those who worked on front-line activities. The use of personal protective gear and regular cleaning of the gear were associated with lower flame retardant levels.
- Higher levels of benzophenone-3 (BP-3), a chemical used in sunscreens and as a stabilizer in plastics, were measured in Southern California firefighters, compared with the general U.S. population. BP-3 is suspected of interfering with hormone action.
- Higher levels of the toxic metal arsenic were found in the Central Valley BEST population compared with the general U.S. population, based on preliminary results.
- A family with significantly elevated mercury levels had been using foreign-made skin-lightening creams adulterated with mercury. This led to a public health alert to medical providers in 2011 and a subsequent follow-up study within CDPH to analyze skin-lightening products for mercury and other harmful contaminants.

Biomonitoring California is continuing to analyze information from these three major studies and will release additional findings as they become available. Preliminary results are available at www.biomonitoring.ca.gov/results.

Biomonitoring California's laboratories are also collaborating with university researchers and other expert scientists to analyze samples collected for other studies. For example, serum samples from thousands of female educators for the California Teachers Study (CTS) are being analyzed for persistent organic pollutants, including flame retardants and persistent pesticides. The Program's analyses for CTS led to the key finding that race (non-white), lower socioeconomic status, and higher body weight were correlated with higher levels of some flame retardants.

Over the past two years, Biomonitoring California has continued to expand its laboratory capability to analyze environmental chemicals in blood and urine samples and its capacity to look for these chemicals in a growing number of Californians. As of the beginning of 2014, Biomonitoring California:

- Is capable of measuring nearly 140 distinct chemicals or their breakdown products in urine, serum, and whole blood. Many of these chemicals have the potential to adversely impact public health.
- Obtained specimens from more than 3,700 Californians.
- Built the capacity to conduct more than 4,000 analyses per year.
- Is able to serve as an early warning system for new chemical exposures and support the state's environmental and occupational health policies.

During the two-year period covered by this report (2012-2013), Biomonitoring California conducted more than 7,000 biomonitoring analyses for toxic chemicals or their breakdown products, including heavy metals, flame retardants, phthalates, and pesticides. Results of these analyses have been returned to participants who requested them and aggregate results for individual studies have been made public on the Program's website.

Informing Participants and the Public

The Program returns detailed results to participants recruited by Biomonitoring California upon their request, as required by the establishing legislation.

- To date, the vast majority of participants (96 percent) recruited by Biomonitoring California have asked to receive their results. Informational packets contain test results, fact sheets, and suggestions on ways to reduce exposures. Participants whose samples were collected by other researchers and analyzed by Biomonitoring California laboratories do not receive their results directly from the Program; such results may be returned to participants by the collaborating investigators.
- The redesigned Biomonitoring California website, <http://www.biomonitoring.ca.gov/>, was launched in July 2013. The improved design includes new features and content, including biomonitoring study descriptions and initial results, fact sheets on chemicals measured, links to Program reports and publications, and a user-friendly guide to biomonitoring. An interactive database of biomonitoring study results was launched in May 2014, which allows the public and researchers to search for data on chemical exposures in Californians.

Program Priorities and Opportunities

Biomonitoring California has identified the following priorities and opportunities for maintaining and improving the Program:

1. Chemicals of Emerging Concern

Through years of key legislative action, California has become a leader in identifying chemicals of emerging concern in the environment and consumer products. To contribute to this effort, and specifically to provide information to the Safer Consumer Products program, Biomonitoring California has prioritized the development of methods to identify new chemicals that present potential risk to Californians. For example, Biomonitoring California is working on new methods to efficiently detect and measure chemicals of emerging concern to the state, including substitutes for bisphenol A, some fragrance compounds, and newer flame retardants.

2. Focused Biomonitoring Studies

The Program places a high priority on identifying opportunities to monitor chemical exposures in subpopulations, including: disadvantaged communities with specific exposure concerns, employees in workplaces where levels of chemicals of concern exceed ambient environmental levels, and sensitive populations such as pregnant women and infants. These studies provide important data that will help inform public health practice and chemical regulation policy to reduce harmful chemical exposures in California.

3. Program Funding

Biomonitoring California continues to seek resources to support its complex laboratory infrastructure and its other programmatic elements. In 2009, the Program was awarded a five-year cooperative agreement (for \$2.65 million annually) by the U.S. Centers for Disease Control and Prevention. This grant allowed Biomonitoring California to launch each of the collaborations described in this report. When the first CDC grant ended in August 2014, Biomonitoring California lost approximately 60 percent of its funding. This decrease was alleviated by a second round of CDC grant awards and state funding. The second round of federal grant funding provides \$1 million annually for five years (the grant began September 1, 2014). The 2014 Budget Act included state funds (\$700,000 per year for two

years, which includes support for four limited-term positions) to support Biomonitoring California. Furthering the support for Biomonitoring in California, the Governor's 2015-16 budget proposes an additional \$900,000 and six 2-year limited-term positions for CDPH, and \$600,000 and two 2-year limited-term positions for the Department of Toxic Substances Control. This funding will be used by the Program to support ongoing identification and measurement of toxic chemicals in Californians, thereby helping to assess the effectiveness of public health and environmental programs in reducing chemical exposures and preventing disease. The funding also will be used to investigate the feasibility of detecting and measuring emerging chemical threats to California.