November 2020 Meeting of the Scientific Guidance Panel for Biomonitoring California

Summary of Panel Input and Recommendations

The Scientific Guidance Panel (SGP) for the California Environmental Contaminant Biomonitoring Program (also known as Biomonitoring California) met on November 12, 2020, via webinar. This document briefly summarizes the Panel's input and recommendations, as well as the range of topics covered in the afternoon discussion session with the guest speakers and audience. Visit the November 2020 SGP meeting page to access the presentations, transcript, and other meeting materials.

AB 617 Biomonitoring Update: Biomarker Research and Potential Study Designs

Presentation: Susan Hurley, MPH, Research Scientist II and Julia Varshavsky, PhD, MPH, Research Scientist III, Safer Alternatives Assessment and Biomonitoring Section, Reproductive and Cancer Hazard Assessment Branch, Office of Environmental Health Hazard Assessment (OEHHA)

Background information: Selected references related to AB 617 biomonitoring

The Panel and audience commented on:

- Importance of taking into account wildfires in the AB 617 biomonitoring study design.
    - Wildfire sources could swamp hyperlocal sources of air pollution (e.g., industrial sources, transportation hubs, and road traffic), which are the focus of AB 617 efforts to reduce exposures in disadvantaged communities.
    - Wildfires are unpredictable and will pose additional complexities in planning the intervention.
    - Ideally, the study would be conducted on a high air pollution day (typically in the winter months) with no active wildfires.
- Potential to access complementary data from the network of commercial low cost PM2.5 sensors that provides good indoor and outdoor coverage in the AB 617 communities under consideration.
- Measuring polycyclic aromatic hydrocarbon (PAH) DNA adducts in uroepithelial cells collected from urine samples as an additional biomarker of mutagenicity.
- Importance of including a control group to account for factors other than the intervention that can affect the levels of certain pollutants (e.g., PAHs).
    - Conducting the study at a site where there are two separate buildings may facilitate this.
- Size of intervention study given limited resources.
    - Current plan is to aim for up to 100 participants.
- Importance of controlling for PAH exposures via tobacco smoke (i.e., first-, second-, and third-hand exposures).
    - This includes using the exposure questionnaire to address behaviors around smoking (e.g., smoking outdoors versus indoors) that can affect exposures.
    - The Thirdhand Smoke Resource Center (https://thirdhandsmoke.org/) was raised as a potentially useful source of information.

- Addressing factors related to measurements pre- and post-shift for staff in a facility or pre- and post-installation of air filtration.
    - It will be important to consider the half-lives of potential biomarkers when designing the type of intervention.
    - Pre-shift exposures to staff will reflect exposures during the prior 24 hours.
        - They may live in entirely different communities with different air pollution levels, and are likely commuting to their job, which can result in significant air pollutant exposures.
        - Given these factors, it may be difficult to observe pre- and post-shift changes in the pollutants of interest.
    - Including a control group, as noted above, could help with understanding these issues.
- Types of air filtration that could be evaluated in the intervention study and related considerations.
    - Understanding the capability of the particular air filtration system or standalone air filter (in particular the effectiveness for volatile organic compounds [VOCs], PM10 and PM2.5) will be essential.
    - Evaluating an air filtration system installed under AB 617, which would generally only address particulate pollution, would be most appropriate for assessing the effectiveness of community planned exposure reduction measures.
    - Installing a more advanced system could expand targeted compounds to include VOCs, for example.
    - The need for clear communication to the community about the capabilities of the chosen air filtration system, including whether it will address COVID-19 (i.e., by reducing levels of the SARS-CoV-2 virus), was highlighted.

Program Update and Overview of Biomonitoring Surveillance Issues

Presentation: Nerissa Wu, Chief, Exposure Assessment Section (EAS), Environmental Health Investigations Branch (EHIB), California Department of Public Health (CDPH)

Background information: Public Health Surveillance Systems: Recent Advances in Their Use and Evaluation

The following topics were covered in the question period after this presentation:

- The importance of tracking both temporal and geographic trends in chemical exposures.
- Surveillance options available through the California Regional Exposure (CARE) Study compared with potential options from partnerships with other programs.
    - The CARE study provides geographic coverage, helps identify specific community priorities, and facilitates outreach to and interaction with people across the state.
    - The Genetic Disease Screening Program (GDSP), which collects serum samples from pregnant women across the state, could offer an opportunity for both temporal and geographic surveillance.
        - Limited demographic data are available for the pregnant women, and include age, gestational age of pregnancy, race, weight at their last appointment, and county of residence.
        - Limited set of analytes can be measured (i.e., serum only; no metals).

        - It may be possible to work with GDSP to obtain geocoded or actual addresses for participants to facilitate identification of potential exposure sources and geographic disparities.

      [Note: This effort would build on the Program's existing project Measuring Analytes in Maternal Archived Samples.]
    - The Program could consider expanding on the Biomonitoring Exposures Study (BEST) (Pilot BEST and Expanded BEST), which was a partnership between Biomonitoring California and Kaiser Permanente Northern California (KPNC) Division of Research.
    - Partnering with community-focused studies or studies with specific research questions was a strategy used early in the Program to obtain samples, and would not fulfill the Program's surveillance mandate
- Possibility of measuring chemicals in wastewater, which can provide exposure information to complement biomonitoring efforts.

Afternoon Session: Challenges in Biomonitoring Surveillance Studies

Response Rates for Population-Based Surveys Presentation

Presentation: Brian Wells, PhD, California Health Interview Survey (CHIS), UCLA Center for Health Policy Research

Remarks from Other State Biomonitoring Programs

Presentation: Amanda Cosser, MPH, New Hampshire Department of Health and Human Services
Presentation: Rachel Long, MSPH, Michigan Department of Health and Human Services
Presentation: Jessica Nelson, PhD, MPH, Minnesota Department of Health

Topics covered in the question periods after the presentations included:

- Aspects of community-engaged research.
    - Works well for specific populations and specific areas.
    - Issues can arise in getting buy-in from particular groups.
    - Community engagement can engender goodwill, but does not always result in improved participation.
    - California poses additional challenges because it is such a large state.
    - This approach is particularly difficult to apply in surveillance studies that are aiming for representative samples.
    - Different levels of engagement depending on the community
- Communicating with potential participants.
    - The use of telephones for survey research is in transition with landlines becoming defunct.
    - A number of studies have implemented texting as part of the contact protocol.
    - New barriers with using cell phones include "spam" blockers, which may flag calls from organizations like CHIS.
- Options for evaluating and addressing response bias.
    - Analyzing "non-response bias," which means looking at the people who did not respond to see if they differ in meaningful ways, can help identify ways to encourage

them to participate. However, this is often a costly effort and increasing participation may require higher incentives, which also add expense.

- Approaches for selecting chemicals to be biomonitored, which included consulting with advisory panels and addressing emerging issues of importance in a particular state.
- Funding sources for state biomonitoring programs, which included cooperative agreements with the Centers for Disease Control and Prevention, partnerships with other state programs in the absence of dedicated state funding, and small grants to collect complementary data (e.g., water testing).
- Michigan's approach for achieving a representative sample.
    - This involves data collection from 18 census tracts each calendar year, with results to be generated every three years.
    - Use of a mobile clinic will facilitate this approach, with ample opportunity for participants in a given tract to provide their samples.
- Minnesota's efforts to address challenges involved in generating a statewide estimate.
    - A key issue is how to represent both the very diverse urban population in Minneapolis/Saint Paul and the rural areas.
    - This includes considering trade-offs of oversampling in some communities and dealing with shifting demographics.
    - They are consulting with local community partners to help address these issues.
    - They will continue to use targeted studies and special investigations to study vulnerable populations not captured by their current statewide surveillance, which is focused on younger children.

Afternoon Discussion Session

Introduction: Nerissa Wu, PhD, CDPH

Questions that were posed to inform the afternoon discussion included:

- What are the priorities for surveillance?
    - For example, would understanding geographic and temporal trends of perfluoroalkyl and polyfluoroalkyl substances (PFASs) in pregnant women fulfill our surveillance mandate?
- Is geographic coverage more important than temporal trends?
- Which analytes should we prioritize (i.e., which biological media are essential to collect)?
- Which sampling approach would be preferred for surveillance?
    - Probability samples with low response rates
    - Non-probability quota samples that better reflect California's demographics
- What approaches should we consider to evaluate the success of statewide surveillance?

The Panel, guest speakers, and audience discussed the above questions and other topics, including:

- Setting priorities for statewide surveillance.
    - Tracking both geographic and temporal trends statewide has not been possible in the CARE Study with current Program resources.
    - The importance of generating data adequate to compare exposures over time was highlighted.

    - Considering prioritizing children as a sensitive subpopulation to biomonitor that could act as a sentinel.
    - Other priorities include understanding differences across:
        - Demographics (economic, ethnic, racial, etc.).
        - Type of community, in particular rural versus urban.
    - Focusing on a single region (an "anchor" study site) would be one option for examining both geographic and temporal variability, but would not be representative of the state.
        - Targeted studies and collaborative opportunities could fill in gaps with the "anchor site" approach.
        - This approach could also identify highly exposed subpopulations within that region, which might be applicable in other regions.
    - The Program should look at what makes California different and focus on exposure concerns and analytes not being addressed by the National Biomonitoring Program implemented as part of NHANES[1] by the Centers for Disease Control and Prevention.
    - Clarifying the specific goals of surveillance will help identify which priority(ies) to elevate as most important.
        - Revisiting the concerns identified in the Program's prior listening sessions with community organizations and environmental justice groups could help with shaping priorities.
- The potential to use biobank samples, or partnering with other research groups to use existing samples, such as those collected in:
    - California Teachers Study, an existing Program lab collaboration.
    - GDSP (see notes above).
    - Newborn Screening Program, which collects blood spots.
    - Mommy's Milk Human Milk Research Biorepository at the University of California, San Diego.
- Limitations of using biobanked samples, including inability to administer exposure questionnaires and no interaction with participants.
- Request that the Program clarify to the Panel the breakdown of fieldwork costs and the current allocation of budget and staff resources, which will help inform Biomonitoring California priority setting.
- Potential benefits of using wastewater to monitor chemical exposures, which could be a resource efficient way to:
    - Measure urinary metabolites, though without individual data on exposures.
    - Cover a large geographic area.
    - Examine temporal trends.
    - Identify emerging concerns.
- Request that the Program further develop the different surveillance options, including budgetary considerations, and bring those to the Panel for discussion.

[1] National Health and Nutrition Examination Survey

Possible Topics for 2021 SGP Meetings

Presentation: Sara Hoover, MS, Chief, Safer Alternatives Assessment and Biomonitoring Section, OEHHA

The presentation outlined planned topics for 2021 SGP meetings. Panel members:

- Generally agreed that biomarkers of effect would be an important topic to discuss.
    - Inclusion of biomarkers of effect could be a low expense addition to future studies to gather data complementary to biomarkers of exposure.
    - Biomonitoring California's focus is on chemical exposures; measuring biomarkers of effect will not be a core activity and will not rely on Program funds.
- Suggested inviting as guest speakers:
    - Researchers from potential collaborative partners, such as biorepository centers.
    - Experts on environmental chemicals in wastewater and sewage sludge to inform discussions on the usefulness of this approach for the Program.