July 2019 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 July 25, 2019 in Oakland. This document briefly summarizes the Panel's input and recommendations on each agenda item and the range of topics discussed with the audience. Visit the July 2019 SGP meeting page to access the presentations, transcript, and other meeting materials.

Program Update and Major Priorities

Presentation: Robin Christensen, ScM, Chief, Biomonitoring Investigation and Outreach Unit, Exposure Assessment Section, Environmental Health Investigations Branch, California Department of Public Health (CDPH)

The Panel reviewed six proposed major priorities for Biomonitoring California, and reached general agreement to include those in the Program's next Report to the Legislature. The Panel recommended adding a seventh priority to highlight the Program's mandate to help evaluate the effectiveness of regulatory programs. The seven priorities are:

1. Maintain core laboratory capabilities and develop innovative and efficient laboratory methods to protect the public's health.
2. Improve the California Regional Exposure (CARE) Study, the Program's statewide surveillance project.
3. Conduct biomonitoring studies that seek to better understand and mitigate environmental health inequities.
4. Provide assistance to local agencies in responding to chemical exposures.
5. Inform evidence-based decision-making by improving access to biomonitoring data.
6. Expand and improve health education for individual participants, healthcare providers, community organizations, and the general public.
7. Conduct biomonitoring studies that are designed to help evaluate the effectiveness of regulatory programs.

Panel members also:

- Discussed the impact of the loss of funding from the Centers for Disease Control and Prevention.
    - Raised concerns about conducting the CARE Study in the absence of adequate resources; proposed suspending the CARE Study until

resources are obtained to support robust biomonitoring surveillance of the state, the Program's core mandate.
    - Proposed focusing on keeping the equipment running and laboratory capacity available by identifying partners who have samples for analysis. It was acknowledged that this approach would not achieve the desired surveillance.
    - Noted that surveillance and targeted studies with collaborators are both important to carry out and can synergize one another.
    - Emphasized the importance of adequate epidemiological support and proposed recruiting doctoral students to assist with data analysis.
- Emphasized the importance of the priority to "conduct biomonitoring studies that seek to better understand and mitigate environmental health inequities," as an important context for:
    - Illustrating the value of the Program.
        - Although the Program was established with a clear goal of surveillance, given limited resources Biomonitoring California can better demonstrate its value through targeted studies, because findings from those studies can address specific issues in our state and its particular regions.
    - Building strong stakeholder partnerships and garnering more support for the Program.
- Commented that the priority to "maintain core laboratory capabilities and develop innovative and efficient laboratory methods to protect the public's health" is fundamental to the other priorities.
    - Discussed ways to conserve lab resources, such as by collaborating with outside labs (trade-offs involved in this were discussed) or not maintaining service contracts on all instruments.
- Discussed aspects of the priority to "inform evidence-based decision-making by improving access to biomonitoring data."
    - Recommended publicizing the Program's policy-relevant research, such as PFAS findings to support drinking water standards or using EBDEP results to support decisions about ports and highways.
- Recommended producing data that support institutional changes to reduce specific chemical exposures, and not only changes in individual behavior.

Results from the Foam Replacement Environmental Exposure Study (FREES)

Presentation: Rebecca Moran, SM, Staff Research Associate, Department of Public Health Sciences, University of California, Davis

Presentation: Kathleen Attfield, ScD, Research Scientist, Exposure Assessment Section, Environmental Health Investigations Branch, CDPH

During the question periods after each talk, the Panel inquired about additional analyses planned for FREES, as listed here (the discussion session is summarized below).

- Examining the results of the dust and foam sampling for OPFRs in relationship to the products that were inventoried in the participants' homes, such as furniture, children's or baby products, plastics, and electronics.
    - Looking at whether the furniture removed in the intervention was a main contributor to OPFR exposures or not.
- Analyzing the effect of household cleaning habits on flame retardant exposures, and looking at whether participants' changed these habits during the study (e.g., by comparing the quantity of dust captured in the sample collection before and after the intervention).
- Evaluating the impact of participants' activity patterns, such as time spent in the home around the time of the sample collection.

Organohalogen Flame Retardants and Chemical Classes: National Academy of Sciences (NAS) Report

Presentation: Gina Solomon, MD, MPH, University of California, San Francisco

Topics covered during the question period for this talk are listed here (the discussion period is summarized below).

- Challenges faced by NAS Committee in defining and interpreting biological activity of a subclass of flame retardants, given the heterogeneous dataset available (i.e., assays for a particular endpoint could be positive for one member of a subclass, negative for another).
    - Looking at ways for addressing truly discordant results, such as by making decisions on how to weight one type of assay over another.
    - NAS report recommendation to extend the most conservative conclusion regarding hazard to the entire subclass in the case of discordant data - i.e., applying the presumption of toxicity.

- Approaches used by NAS Committee for assigning organohalogen flame retardants (OFRs) to particular subclasses.
    - Application of quantitative structure-activity tools, which did not always produce consistent results.
    - Potential for misclassification of OFRs in resolving conflicting results, which required decisions to be made about where to place chemicals.
    - NAS report recommendation to settle on a classification and not endlessly revisit that (i.e., move forward with the hazard evaluation of the subclass and only reclassify a chemical if clearly discordant data emerge).
- Benefits of taking into account mechanistic data that have not been traditionally used in hazard identification.
- The US Environmental Protection Agency's recent move away from animal testing, with an eventual phase-out, and the potential impact of a dearth of *in vivo* data on interpreting biological activity.

Flame Retardants: Insights from Biomonitoring California Findings and Looking Forward

Introduction to Discussion Session

The Panel, guest speakers, and audience discussed a range of topics, including:

- Defining chemical groups by function, like flame retardants:
    - Can pose challenges for conducting health hazard evaluation, because of the potential for significant heterogeneity in molecular structure and biological effects.
    - Makes sense from the perspective of biomonitoring and other exposure research, since the function can point to common exposure pathways.
- Focusing on newly emerging flame retardants, such as polymeric flame retardants (e.g., butadiene styrene brominated copolymer).
    - Increasing in use, but very little data available on exposure patterns.
    - Less bioavailable as a polymer, but can break down.
- Evaluating the effectiveness of the California flame retardant ban going into effect in 2020.
    - Challenges in interpreting the effect of the ban on replacement flame retardants like OPFRs, which are short-lived and have complicated exposure patterns.

    - Importance of ongoing surveillance to track flame retardant exposures over time, and demonstrate the effectiveness of regulatory interventions.
- Importance of continuing to measure previously phased-out flame retardants, like PBDEs.
    - Wide exposures still ongoing in the population.
    - As PBDE-containing products go to landfills, communities near those disposal sites could be increasingly exposed.
    - More research on the lifecycle of PBDEs and exposures to potentially vulnerable populations would be valuable.
    - PBDEs and other persistent flame retardants may be mobilized in natural events like fires and floods, resulting in additional pathways of exposure.
- Considering measurement of flame retardant combustion byproducts, such as brominated dioxins, and furans, and other toxic combustion byproducts.
- Focusing on infants and children for biomonitoring studies of flame retardants.
    - Known higher exposure patterns for PBDEs and some of the replacement flame retardants.
    - Importance of assessing policy interventions aimed at addressing children's products as potentially significant sources of exposure.
- Design of intervention studies.
    - Thinking carefully about the questions being posed, and ensuring the intervention can adequately address those.
    - Considering factors like the half-life of the chemical and potential diversity in exposure sources to design an effective intervention.
    - Choosing an intervention with which the study population can more easily comply.
    - Ensuring that recommendations for changes in behavior are supported by the data.
    - Considering interventions at the societal level (e.g., changing the flame retardancy standards; banning a pesticide), and not only individual behavior changes (e.g., changing your couch; changing the foods you buy).
    - Using complementary data, like dust measurements, to aid in the interpretation of biomonitoring results.
- Periodically reviewing the broad classes of flame retardants that are on the designated chemical list and identifying specific subclasses or chemicals to focus on for biomonitoring (e.g., a flame retardant that is newly increasing in use).

- Applying non-targeted screening to help identify newly emerging flame retardants as priorities for biomonitoring.
- Analyzing biobank samples to assess population exposures to flame retardants and other chemicals.
    - Continuation of the Program's Measuring Analytes in Maternal Archived Samples (MAMAS) study.
    - Benefits, including cost-effectiveness and flexibility to conduct non-targeted screening for emerging chemicals without having to return results.
    - Challenges, including methods used for biobank sample collection that preclude analysis of certain chemicals (e.g., metals), low volumes, and limited information on population (demographics only, and no exposure information).

Preliminary Screening of Potential Designated Chemicals for Future Consideration: Quaternary ammonium compounds (QACs)

Document: Preliminary Screening of Quaternary Ammonium Compounds

Presentation: Shoba Iyer, PhD, Staff Toxicologist, Safer Alternatives Assessment and Biomonitoring Section, Reproductive and Cancer Hazard Assessment Branch, Office of Environmental Health Hazard Assessment

Topics covered in the discussion of the preliminary screen for QACs included:

- Evidence of broad exposures to these compounds:
    - High production volumes.
    - Direct human contact to QACs in a wide variety of products, with occupational groups like janitorial workers experiencing particularly high exposures.
    - Frequent detections of benzylalkyldimethyl ammonium, dialkyldimethyl ammonium, and alkyltrimethyl ammonium compounds (BACs, DADMACs, and ATMACs) in sediment and water samples.
    - Frequent detections of QACs in non-targeted analyses of various matrices.
- Evidence that QACs get into the body:
    - A preliminary biomonitoring study found that one third of university students who were biomonitored had detectable levels of some QACs.

- Analytical methods that would be required for biomonitoring this large class of compounds:
    - Depending on the structure of the QACs of interest, the general overall procedure is likely to be similar.
    - For environmental samples (e.g., sediment and water samples), a single method can detect BACs, DADMACs, and ATMACs with C8-C18 alkyl chain lengths.

Panel members were asked to select one group of chemicals for consideration in 2020 as potential designated chemicals, choosing between QACs, previously screened pesticide classes, or previously screened classes of chemicals used in UV applications. The Panel unanimously selected QACs. OEHHA will prepare a potential designated chemical document on QACs, and will continue to track the other previously screened classes.