

March 2024 Meeting of the Scientific Guidance Panel for Biomonitoring California

Summary of Input and Recommendations

The Scientific Guidance Panel (SGP) for the California Environmental Contaminant Biomonitoring Program (also known as Biomonitoring California) was held virtually and in person at Dharma College in Berkeley on March 20, 2024. This document briefly summarizes input and recommendations received from the Panel, as well as the range of topics discussed with the audience. Visit the [March 2024 SGP meeting page](#) to access the presentations, complete transcript, and other meeting materials.

SGP Panel Members in Attendance

Megan R. Schwarzman, MD, MPH, Chair
Ulrike Luderer, MD, PhD
Carl Cranor, PhD, MSL
Thomas McKone, PhD
Oliver Fiehn, PhD
Jose Suarez, MD, PhD, MPH, *attended remotely*
Amy Padula, PhD, MSc

Program Updates

[Presentation](#): Nerissa Wu, PhD, MPH, California Department of Public Health (CDPH)
[Presentation](#): Toki Fillman, MS, CDPH
[Presentation](#): Wendy Linck, PG, PMP, Division of Water Quality, State Water Resources Control Board (SWRCB)

Panel members discussed the following topics with staff presenters:

- Examining variables that may be influencing the concentrations of perfluoroalkyl and polyfluoroalkyl substances (PFASs) in serum collected during the Asian/Pacific Islander Community Exposures (ACE) Project and the California Regional Exposure (CARE) Study.
 - While the Program collected survey data on seafood consumption for ACE, identifying data on concentrations of PFASs in whole fish may improve our understanding of dietary contributions to serum PFAS levels in this population.
 - For the CARE study, the amount of tap water and bottled water participants consumed may be an important variable to look at. Although the Program did not collect data on the amount of water participants consumed, they did include a survey question about which type of water (tap vs bottled) they primarily consumed. Preliminary results have suggested that there are stronger associations for PFHxS in participants that primarily drank tap water compared to participants that primarily drank

- bottled water.
 - Collaborators from Boston University looked at combined contributions of drinking water (using Unregulated Contaminant Monitoring Rule (UCMR 3) data) and diet on serum concentrations of PFASs in CARE participants and found no associations between diet and levels of PFOA and PFHxS, and small effects for PFOS.
 - Potential exposures to PFASs via air could be explored by using the addresses of CARE participants to identify proximity to sources of airborne PFASs and assessing whether any associations with serum concentrations are apparent.
 - Data from UCMR 5 on finished water could be used to examine the effectiveness of California's different treatment technologies in removing PFASs.
- Fluorinated compounds that were not captured by the SWRCB's targeted analyses, but were captured by non-targeted methods:
 - Ultra-short perfluorinated compounds that are being detected in ground water.
 - PFAS precursors and newer formulations of PFASs that are being used at industrial sites, including in aqueous film-forming foam.
 - Additional organofluorine compounds
 - The absorbable organic fraction (AOF) was selected for the non-targeted methods.
 - AOF is more cost effective than targeted analyses.
 - More information is needed to see if the method is applicable to serum or plasma samples.
 - The gap between PFASs identified through targeted analyses and non-targeted analyses further underscores the need for them to be regulated as a class.
- Future plans by the SWRCB to sample 4,000 wells across the state and perform both targeted and non-targeted analyses to identify PFASs in drinking water.
 - Non-targeted analyses for PFASs in biological samples from STEPS could be compared to these data from the SWRCB.
- Opportunities to use the STEPS cohort to understand temporal patterns of PFAS exposures in California.
 - Multiple measures across years could allow the Program to see temporal trends in the current panel of 42 PFASs and other non-targeted total organic fluorine compounds.
 - The volume of the samples is small, and more research is needed to see if pooling the STEPS samples would be a viable option.
- Panel member Carl Cranor highlighted the need for a more preventative

approach to PFAS releases into the environment to counter social and legal shortcomings.

- Nancy Buermeyer of Breast Cancer Prevention Partners (BCPP) mentioned that the data presented on additional fluorinated compounds being measured by non-targeted methods in drinking water will be used in efforts to pass legislation (SB 903) this year. The goal of the bill is to ban non-essential uses of PFASs. The bill is authored by Senator Nancy Skinner and is sponsored by the Natural Resources Defense Council (NRDC), Environmental Working Group, Clean Water Action, the California Association of Sanitation Agencies (CASA), and BCPP.

Biomonitoring for Oil and Gas Exposures

Presentation: Jill Johnston, PhD, Associate Professor of Population and Public Health Sciences, University of Southern California

Presentation: Yan Lin, PhD, Postdoctoral Associate, Duke Global Health Institute

Panel members discussed the following topics with staff presenters:

- Identifying chemicals found near oil and gas extraction activities for monitoring.
 - Odor control agents, which are used to mask the smell of chemicals emitted from oil and gas wells, could be monitored.
 - Nickel and manganese, which have been identified through use of particulate matter (PM) filters near drill sites and are used as an indicator of high exposure to oil in occupational studies.
 - Volatile organic compounds (VOCs). Air monitoring in urban environments has highlighted high concentrations of VOCs near oil and gas extraction activities.
 - PFASs may be used in drilling fluids in oil and gas facilities and have been measured in air near fluoropolymer manufacturing plants.
 - Quaternary ammonium compounds are used as oil field biocides and corrosion inhibitors in oil and gas operations.
 - There is a [detailed database](#) on oil and gas wells and related facilities throughout California that is housed by the Department of Conservation – California Geological Energy Management Division.
- The use of toenails as a biomatrix to measure exposure to chemicals.
 - Communities are generally comfortable with providing toenails. They were also more convenient to collect than urine or blood, especially during the COVID-19 pandemic, and are representative of a longer integration rate compared to hair.
- Important considerations when using carboxylic metabolites of polycyclic aromatic hydrocarbons (PAHs) as a method to measure petrogenic sources of PAHs compared to pyrogenic sources.

- While carboxylic metabolites of PAHs do not seem to be influenced by genetic factors, it is important try to control for any genetic or other factors such as diet that might influence the concentration of PAHs in urine.
 - Preliminary research has indicated that the half-lives of carboxylic metabolites of PAHs are less than 24 hours, suggesting that their detection is indicative of recent exposure.
 - The atmospheric half-lives of PAHs depends on the phase of the chemical. PAHs in the gas phase may have a shorter half-life than PAHs in the particle phase.
 - Future studies could try to identify the impact of wildfires on levels of carboxylic metabolites of PAHs.
- Lipid mediators, triglycerides, and oxidative and inflammatory biomarkers could be measured in future Biomonitoring California studies to examine the metabolic impacts of chemical exposures on study participants.
 - Considerations when planning a biomonitoring study focused on communities living near oil and gas facilities:
 - The control population needs to be chosen carefully to help account for other sources of exposures, such as from traffic activities or occupation.
 - Some studies looking at oil and gas exposures have populations living within a buffer zone of oil and gas facilities and a control population that is further away but in the same region.
 - Passive sampling methods, such as silicon wristbands, could be used to help stratify exposure groups. Wristbands could also account for other factors that may be contributing to exposure (e.g., time spent in other locations such as school or work).
 - Only some PAHs may be detectable via wristbands. High molecular weight PAHs are not typically detectable in wristbands.
 - Oil wells in LA county that plan to phase out production due to legislation could be prioritized to examine changes in exposure over time. Another opportunity to examine changes in exposure over time may result from proposed legislation in Richmond, CA that would create buffer zones around refineries, particularly those that are located near day care centers.
 - Factors that may affect indoor air quality, such as air purifiers or the type and presence of air-cooling systems.
 - Exposures from trucks and other heavy machinery involved in activities at oil and gas fields, including the transport of oil.

Open Public Comment

- Dr. Ahimsa Porter Sumchai provided an update on the Hunters Point Community Biomonitoring Program. Thirty-five potential toxicants, including some chemicals of concern on the Proposition 65 list, were detected within a one-mile perimeter

of superfund sites at Hunters Point. The program has geospatially mapped a community within one mile of these superfund sites. The registry consists of 100 people and 85 residents, all with evidence of risk of exposure or proof of exposure and adverse health effects. The most detected chemicals in soil above reference range were heavy metals and radionucleotides. Urinary screenings have detected radioisotopes, specifically radioactive potassium that is a progeny of plutonium, uranium, and cesium. The next steps are to formalize the registry and to acquire funding necessary for advocacy.