November 10, 2011 Meeting of the Scientific Guidance Panel for Biomonitoring California

Summary of Meeting Highlights and Panel Input and Recommendations

The Scientific Guidance Panel (SGP) for the California Environmental Contaminant Biomonitoring Program (also known as Biomonitoring California) met on November 10, 2011 in Sacramento. This summary includes highlights of the meeting and the SGP's recommendations and input on various topics. Meeting materials, including the agenda, presentations and the full transcript, are available on the meeting webpage.

Program and Laboratory Updates

Presenters:

Dr. Rupali Das, Chief of the Exposure Assessment Section, California Department of Public Health (CDPH) and Lead of Biomonitoring California
Dr. Jianwen She, Chief of the Biochemistry Section in the Environmental Health Laboratory (EHL) Branch at the California Department of Public Health
Dr. Myrto Petreas, Chief of the Environmental Chemistry Branch in the Environmental Chemistry Laboratory (ECL) at the California Department of Toxic Substances Control (DTSC)

Dr. Rupali Das gave an update on overall Program funding status and staffing changes and highlighted some Program activities and accomplishments:

- Ongoing conference calls and the first in-person meeting among the three recipients of the Centers for Disease Control and Prevention (CDC) Cooperative Agreements – California, Washington and New York.
- Current status of the Program's ongoing pilot projects including the Maternal and Infant Environmental Exposure Project (MIEEP), the Firefighter Occupational Exposures Project (FOX) and the Biomonitoring Exposures Study (BEST):
    - MIEEP: Convenience sample of 92 mother-infant pairs. Collaboration with UC Berkeley and UC San Francisco. Recruitment from San Francisco General Hospital completed. Data collection, including biological samples and questionnaires, completed. Analysis of maternal and cord blood and maternal urine in progress by Biomonitoring California laboratories for a total of approximately 100 different chemicals. Questionnaire data entry and analysis underway. First phase of results return planned for early 2012.
    - FOX: Convenience sample of 101 firefighters. Collaboration with UC Irvine and the Orange County Fire Authority. Data collection, including biological samples and questionnaires, completed. Analysis of blood and

urine in progress for a total of approximately 100 different chemicals. Questionnaire data entry completed and analysis underway. Dust samples collected from twenty fire stations and analysis underway (using non-Program funding source). First phase of results return planned for early 2012.

- BEST: Stratified random sample of 100 adults from seven counties in the Central Valley. Pilot project in collaboration with Kaiser Permanente Northern California Research Program on Genes, Environment and Health. Recruitment is in progress. Data collection underway for this initial pilot. Currently planning with Kaiser the expansion of BEST to include more participants.

- OEHHA's chemical selection and screening work, including developing a potential designated document on non-halogenated aromatic phosphates and screening new chemicals as potential candidates to consider for designation.
- Public involvement activities, including finalizing the Public Involvement Plan, exploring the development of a social media presence for the Program, and reaching out to additional stakeholders through other listservs, such as the Cal/EPA Environmental Justice listserv.
- Revising the Biomonitoring California website to make it more user-friendly, improve readability, and increase relevance for a general audience.
- Developing the Program's second Request for Information from researchers interested in providing archived samples from California residents for analysis of specific chemicals by Biomonitoring California laboratories.

Dr. Jianwen She provided an update on EHL activities. He summarized the status of the MIEEP and FOX sample analyses: Sample preparation (aliquoting), analysis, and data review and approval are complete for 101 FOX blood metals samples and 140 MIEEP blood metals. Sample preparation and instrument analysis completed for pesticides, environmental phenols, and hydroxy-PAHs for 90 maternal urine samples and 5 field blanks from MIEEP. Data review and approval are still in progress for these MIEEP analyses. Dr. She reported that all laboratory equipment purchased by EHL under the CDC Cooperative Agreement has now been set up and is in use. Dr. She also discussed the status of laboratory methods:

- In production (i.e., samples are being run): Metals in blood, phthalate metabolites, common and specific organophosphate pesticide metabolites, environmental phenols and hydroxy polycyclic aromatic hydrocarbons [hydroxy-PAHs]) in urine.
- Under validation: Polychlorinated biphenyls [PCBs] and polybrominated diphenyl ethers [PBDEs] in dry blood spots and arsenic speciation in urine;
- Under development: Metals in urine and perchlorate.

Dr. She noted other EHL activities, including expanding the number of organophosphate and pyrethroid pesticides that can be analyzed and establishment of a data review checklist.

Dr. Myrto Petreas provided an update on ECL activities. She reported on the status of sample analysis for FOX and MIEEP. For MIEEP, ECL has completed instrument analysis for PFCs and PBDEs in 141 serum samples and data review is underway. Instrument analysis and data review are partially complete for PCBs, OCPs and BFRs in the MIEEP serum samples. For FOX, PFC instrument analysis and data review are complete for all 101 participants.

Dr. Petreas outlined capability for selected chemicals on the priority list:

- In production (i.e., samples are being run): PCBs, organochlorine pesticides, PBDEs, perfluorochemicals (PFCs) and newer brominated flame retardants (BFRs).
- Validated/testing underway with archived samples: Brominated phenols in serum (which also captures bisphenol A [BPA]).
- Proposed for development: Branched PFCs.

ECL found that initial results from analyzing real (as compared to spiked) samples for the newer BFRs were not promising. The reasons for the lack of significant detection of most of the newer BFRs analyzed so far are not clear, and this issue will be researched further.

Dr. Petreas also highlighted opportunities for collaboration and technology transfer with colleagues from other states and visiting scientists.

Panel members:

- Asked for more information on the outcome of the meeting among the three states (recipients of CDC Cooperative Agreements) and CDC.
- Commended the laboratories on their research progress and efforts to fill vacancies in laboratory staff.
- Noted the advantages of dry blood spot collection for providing broader coverage (i.e., more people) for less cost compared to serum collection, and the very large numbers of blood spots already being routinely collected from infants in California.
- Expressed concern regarding possible contamination of dry blood spot samples from collection materials and noted the potential for the state to influence the manufacturing process to reduce these issues.

A public commenter, Davis Baltz of Commonweal, complimented the staff of Biomonitoring California for their continued progress under difficult circumstances. Mr.

Baltz emphasized the importance of these studies and anticipates great interest in Program findings. Mr. Baltz also discussed Commonweal's new environmental health advocate training program. He offered to connect the Program with Commonweal's new contacts within the Spanish speaking community of the Central Valley for the second phase of the BEST study.

Biomonitoring for Exposure Assessment: Challenges and Future Directions

Presenter: Dr. Antonia Calafat, Chief, Organic Analytical Branch, National Center for Environmental Health, Centers for Disease Control and Prevention

Dr. Calafat spoke on the use of biomonitoring as a tool for exposure assessment and its associated challenges. She talked about analytical chemistry issues in biomonitoring, optimal characteristics of analytical methods, selection of biomarkers, selection of biological matrices to sample, and the effect of collection protocols on interpretation. Dr. Calafat showed examples of the variability in measured levels for nonpersistent chemicals and discussed sampling strategies for these chemicals. She explained that even with this variability, exposure differences are observed between groups (e.g., differences in methyl paraben levels between men and women and among different age groups).

Panel members:

- Discussed determining the numbers of biomonitoring samples (which are typically single "snapshots" in time) needed to get a better picture of what is actually happening with the levels of chemicals. The focus was on how best to sort out real trends in the chemical levels versus noise.
- Discussed trying to determine more persistent markers as a way to better interpret information from short-term markers, like levels in blood or urine that are likely to change quickly. This could lead to better interpretation of long-term trends and daily oscillations due to diet or something in people's environment.
- Suggested that the Program do more research on intra- and inter-individual variability and extend to different age groups.

Davis Baltz, of Commonweal, inquired about the availability of the next national exposure report and if there are any significant increases in examined analytes. Dr. Calafat anticipated that a web-based report should be available in early 2012, with largely the same chemicals that have been previously measured.

Presentations by Washington and New York State Biomonitoring Programs

Washington Environmental Biomonitoring Survey (WEBS)

Presenter: Dr. Blaine Rhodes, Office Director, Environmental Laboratory Sciences, Washington State Public Health Laboratories

Dr. Rhodes outlined the development and goals of the Washington Environmental Biomonitoring Survey (WEBS), funded by CDC. Urinary analytes measured so far include metabolites of organophosphates and pyrethroid pesticides, and metals (e.g., lead, uranium, total arsenic and speciated arsenic). An important finding was the observation of total arsenic levels in urine from Washington residents that are approximately twice those reported by NHANES for the U.S. population. Mr. Rhodes described WEBS studies of high risk populations: a population on Whidbey Island with high exposure to arsenic in groundwater (sample collection and results return completed; data analysis underway) and pyrethroid pesticide applicators (recruitment underway). He outlined next steps, including analyzing samples for bisphenol A metabolites and phthalates and measurement of hair mercury in frequent consumers of seafood, with a focus on Asian populations.

Panel members:

- Commented on the relatively high urinary levels of total arsenic in Washington State compared to the national cohort and inquired about sources. WEBS staff discussed geological sources and industrial sources present in the region.
- Commented that study of mercury is warranted in coastal states, such as Washington and California, and will be likely to detect higher levels than in the national biomonitoring study because of higher seafood consumption in these states.

Expanding the Capability and Capacity for Biomonitoring at the Wadsworth Center, New York State Department of Health

Presenter: Dr. Kenneth Aldous, Director, Division of Environmental Health Sciences, Wadsworth Center, New York State Department of Health

Dr. Aldous talked about the history of the program, its specific aims and the laboratories' capabilities. Major projects at Wadsworth Center include: evaluating the impact of New York legislation banning smoking in public places, collaborating with the New York City Health and Nutrition Examination Survey, studying PBDE levels in New York anglers, and exploring using newborn blood to evaluate PFC exposures. Dr. Aldous outlined upcoming efforts, such as an investigation of depleted uranium in urine at a former National Lead location and blood mercury speciation in Asian populations.

Davis Baltz, from Commonweal, inquired about differing approaches and thresholds for returning results to participants between the CDC programs in New York, Washington and California. The ensuing discussion highlighted federal and state laws and regulations that govern returning biomonitoring results. In New York and Washington, certain results are returned to the participants if the chemical level is above a clinical reference level (e.g., for lead). For Biomonitoring California, all results are legally required to be returned upon request of the study participant.

Update on Maternal and Infant Environmental Exposure Project (MIEEP or Chemicals in Our Bodies Project)

Presenter: Carrie Dickenson, study coordinator for MIEEP at the University of California, San Francisco Program on Reproductive Health and the Environment

Ms. Dickenson reiterated the four MIEEP goals; (1) to measure and compare levels of about 100 different chemicals in approximately 75-100 maternal infant pairs; (2) to identify leading sources of exposure to a subset of these chemicals; (3) to develop and test approaches to provide biomonitoring results to participants; and (4) to evaluate the association of chemical exposures and pregnancy and birth outcomes. Participants included English and Spanish speakers 18 years and older, with a due date within the recruitment timeline and their pregnancy could not be considered high risk. Recruitment began in July 2012 and ended in June 2011. Ms. Dickenson outlined recruitment statistics. She described procedures for chart abstraction, questionnaire administration, and specimen collection. The MIEEP questionnaire focused on pesticides, perfluorinated chemicals, and bisphenol A. Return of results to participants and data analysis and validation are in progress.

Panel member Dr. Gina Solomon inquired whether the mothers had received any medications or were administered IVs prior to the samples being collected. Ms. Dickenson responded that urine samples were collected several weeks prior to delivery. With regard to blood samples, the women were coming into the hospital at all hours of the day and night so it was not clear if the women had received an IV prior to the blood collection. Ms. Dickenson further noted that the chart abstraction data is available, which should reveal medications they may have been taking previously or received at the hospital.

Summary of Results Return Testing in the Firefighter Occupational Exposures (FOX) Project

Presenters:
Dr. Sandy McNeel, Research Scientist, Environmental Health Investigations Branch, CDPH
Ms. Amiko Mayeno, Health Educator, Biomonitoring California

Dr. McNeel and Ms. Mayeno presented findings from the usability testing of results return materials for the FOX Project. They discussed elements of the draft results return packages and insights gained from interviews with firefighters regarding the materials. Improvements that were made to the materials as a result of the firefighter input were highlighted. They noted that the first set of test results will be returned to FOX participants after Institutional Review Board approval of the results return materials.

Panel members:

- Commended the Program for modifying materials based on usability testing with firefighters.
- Commented on the applicability of what has been learned from the development of the results return materials for future biomonitoring efforts in different populations.
- Suggested looking into specific firefighting practices, such as overhaul, that have the potential for increased exposure to certain chemicals. This could help the Program in developing directed recommendations for reducing exposure in the occupational setting.