Program Update

Kathleen Attfield, ScD

Presentation to the Scientific Guidance Panel Meeting

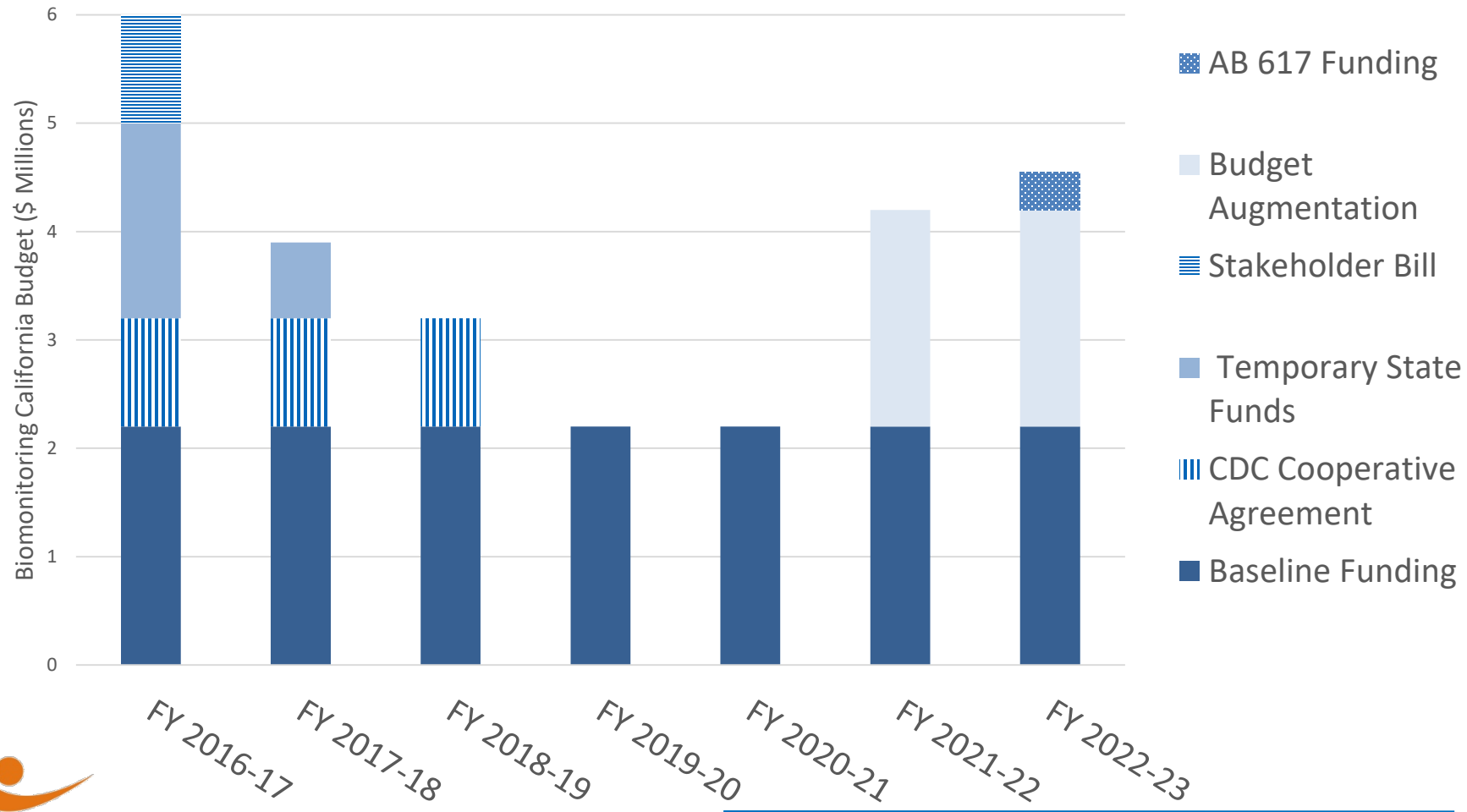
July 22, 2022

CDPH California Department of PublicHealth

Overview

- Administrative updates
- Surveillance project updates
- Laboratory updates

Program budget



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Upcoming Biomonitoring CA positions

- Epidemiologists
  - Research Scientists I, II, IV
- Laboratorians
  - Research Scientists I, II, III
  - Research Scientist Supervisor
  - American Public Health Laboratories Fellows

See CalCareers for more information on open positions.

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Staff updates

Faye Andrews*	Jagdish Dhaliwal	Sara Hoover*	Martha Sandy
Dinesh Adhikari	Joginder Dhaliwal	Susan Hurley	Roshni Sarala
Kathleen Attfield	Dina Dobraca	Simon Ip*	Jianwen She
Hyoung Gee Baek	Jeff Fowles	Stephanie Jarmul	Dan Sultana
Paramjit Behniwal	Qi Gavin	Duyen Kauffman	Darcy Tarrant
Key-Young Choe	Songmei Gao	Emilie Kadhim^	Miaomiao Wang
Sabrina Crispo Smith	Ranjit Gill	Alveen Kumar*	Shizhong Wang
Adam D'Amico	Cheryl Holzmeyer	June-Soo Park	Yunzhu (Judy) Wang^
Josephine DeGuzman	Amanda Hooker^	Myrto Petreas	Nerissa Wu

*Departing staff, ^New staff

Surveillance projects updates

Biomonitoring Exposures Study (BEST)

- New initiative – weighting the data to the underlying population of the region

Biomonitoring Exposures Study (BEST)

- Collaboration with Division of Research, Kaiser Permanente Northern California (KPNC)
- Stratified random sample of adult KPNC members from the Central Valley

Expanded BEST

Study design	
Study period	2013
Number of participants	341
Language	English and Spanish
Targeted recruitment	Special emphasis on sampling of Hispanic and Asian/Pacific Islander KPNC members
Sample collection	KPNC lab order system

Expanded BEST demographics

Demographic characteristic	Number	Study Percent (%)	Central Valley Population Percent (%)
18-39 years	128	37.5	42.7
40+ years	213	62.5	57.3
Male	161	47.2	48.8
Female	180	52.8	51.2
Asian	114	33.4	12.6
Black	43	12.6	6.5
Hispanic or Latino, English preferred language	78	22.9	25.7
Hispanic or Latino, Spanish preferred language	59	17.3	9.0
White	47	13.8	46.2
Urban	232	68.0	91.7
Rural	109	32.0	8.3

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Expanded BEST chemical panels

- Metals
- Environmental phenols
- Pesticides
  - Herbicides
  - Organophosphate pesticides
  - Pyrethroids
  - Organochlorine pesticides
  - Other pesticides (i.e., DEET)
- Perchlorate
- Phthalates
- Polycyclic aromatic hydrocarbons (PAHs)
- Perfluoroalkyl and polyfluoroalkyl substances (PFASs)
- Polybrominated diphenyl ethers (PBDEs)
- Polychlorinated biphenyls (PCBs)

Examples of weighted data differences

Analyte	Units	Geometric mean and 95% confidence interval			
		Unweighted		Weighted	
Blood mercury	µg/L	0.826	(0.731, 0.933)	0.677	(0.573, 0.799)
Urinary mercury	µg/g creatinine	0.210	(0.181, 0.245)	0.162	(0.130, 0.202)
Urinary arsenic	µg/g creatinine	11.8	(10.5, 13.2)	9.40	(8.25, 10.7)

- Weighted data to be added to the Biomonitoring California website

Blood mercury

	Weighted GM	(95% CI)	Weighted Percentiles 25th	50th	75th	90th	95th
18-39 years	0.493	(0.392, 0.621)	0.221	0.478	0.811	1.26	1.64
40+ years	0.869	(0.706, 1.07)	0.554	0.930	1.74	3.49	4.66
Male	0.647	(0.504, 0.830)	0.230	0.662	1.21	1.74	4.66
Female	0.706	(0.567, 0.880)	0.455	0.670	1.12	2.51	3.13
Asian	1.63	(1.18, 2.25)	0.974	1.64	4.04	7.99	8.63
Black	0.762	(0.514, 1.13)	0.431	0.478	0.951	2.14	2.77
Hispanic or Latino, English preferred language	0.472	(0.374, 0.597)	0.227	0.675	1.15	1.29	1.26
Hispanic or Latino, Spanish preferred language	0.571	(0.396, 0.824)	0.190	0.595	0.861	1.08	1.44
White	0.651	(0.471, 0.899)	0.283	0.696	1.41	2.51	3.49
Urban	0.685	(0.572, 0.821)	0.283	0.662	1.21	2.51	3.49
Rural	0.603	(0.428, 0.850)	0.240	0.784	1.05	1.34	1.92

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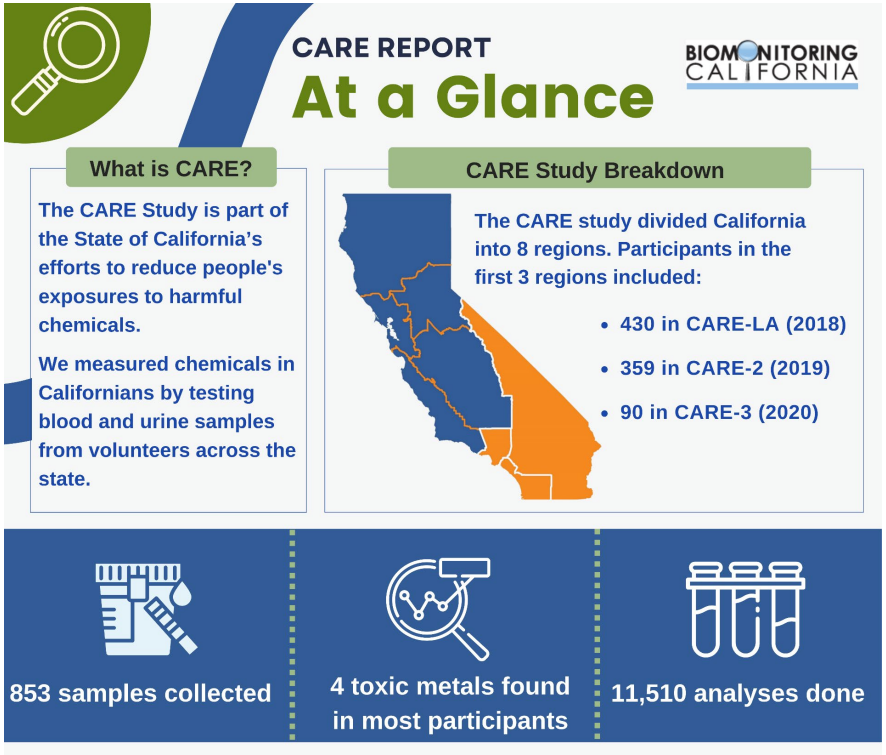
CARE-LA and CARE-2 update

- Weighted data, prepping for website update
- Draft CARE report
  - Weighted and unweighted data
  - Demographic trends
    - Age, gender, race/ethnicity, income, education



CARE-3 data posted to online database

- Due to the COVID-19 emergency, field work was stopped in San Diego and Orange counties in March 2020
- 90 study participants had completed all study steps
- CARE-3 findings therefore cannot be generalized to the Region 3 population
- Chemicals measured:
  - Metals
  - PFAS
  - Environmental phenols

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CARE-3 data findings

- Metals detected in almost all participants
  - In blood: lead, mercury, cadmium, and manganese were detected in >95% of participants
  - In urine: arsenic, cadmium, and mercury were detected in > 88%
  - 9 CARE-3 participants (10%) had at least one metal level over the relevant Level of Concern (LOC)

CARE-3 data findings

- At least one PFAS detected in 98% of participants
  - On average, 7 PFASs were detected in participants
  - PFOA, PFOS, and PFHxS were the most commonly detected PFASs (> 95% of participants)
  - Levels were similar to CARE-LA and CARE-2
  - Levels were lower than 2017-2018 NHANES

Collaborations on existing projects and data

- Evaluating whether peak intakes of PFASs were higher in California than the US general population using CARE data
  - With Stockholm University
- Informing drinking water maximum contaminant level for various PFASs using CARE Study data
  - With CA Waterboards and Boston University School of Public Health
- Examining occupational exposures within Asian/Pacific Islander projects
  - With Silent Spring Institute

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Others?

New surveillance work:

Employing maternal serum samples from the Genetic Disease Screening Program

- Planning stages
  - Lab capacity for 500 samples per year
  - Reviewing PFASs literature
  - Consulting with PFASs researchers
  - Assessing budgeting, timeline, and logistical constraints
  - Assessing potential to address different surveillance questions

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New surveillance work

- Planning stages
  - Focus on PFASs and time trend questions first
  - Exploring an alternate year design
    - Make use of banked (low volume) versus non-banked (higher volume) samples
    - Allows retrospective analyses (banked)
    - Allows non-targeted analyses and/or other analytes (non-banked)

New surveillance work

- Reviewing prior data from GDSP samples

Years	Total Number	Samples with PFAS analyses	Geography
2012	460	200	San Diego/Orange counties
2015	540	292	Los Angeles; Riverside/San Bernardino; Alameda/Contra Costa; Northern counties
2016	300	96	Southern counties; SF/Central Coast; North Bay

New surveillance work

- Gaining permissions
  - Amendment to prior CPHS IRB application
  - Amendment to prior Biobank request
  - Vital Statistics application

CDPH Environmental Health Laboratory Updates

- Method development in progress
  - VOC metabolites
  - Mercury speciation
  - PAHs - transferring to a new analytical platform, from high resolution GC/MS to GC/QQQ: 7010B Quadrupole MS/MS with Agilent 8890 GC System

CDPH Environmental Health Laboratory Updates

- Untargeted analyses
  - Unknown parent compounds in blood and environmental samples
    - New instrument - Agilent 7250 GC/Q-TOF
  - Unknown metabolites in urine
    - Training new staff to use HPLC / Q Exactive Plus

CDPH Environmental Health Laboratory Updates

- Untargeted analyses
  - Mainly for the analysis of unknown parent compounds in blood and environmental samples (Installation of Agilent 7250 GC/Q-TOF; new instrument)
  - Mainly for the analysis of unknown metabolites in urine (training new staff to use HPLC / Q Exactive Plus)

CDPH Environmental Health Laboratory updates

- Method development in progress
  - VOC Metabolites
  - Mercury speciation
  - PAHs
- New instruments
  - 7010B Quadrupole MS/MS EI with Agilent 8890 GC System
    - Analysis of OH-PAHs in urine; will shorten analysis time
  - Gerstel Workstation / Liquid Handler
    - Automation for existing liquid-liquid extraction procedures
  - Agilent 7250 GC/Q-TOF
    - Analysis of unknowns in urine

DTSC Environmental Chemistry Lab updates

- Siloxanes
  - Initiated method development of 4 siloxanes (D3, D4, D5, D6)
    - GC-MS/MS and SPME (solid phase micro-extraction) sampling system.
- Completed migration of legacy method of 12 PFASs to newer instrument
  - Decreased injected sample volume
  - Decreased analysis time by 50%
  - Method validated and added to ISO17025 accreditation

DTSC Environmental Chemistry Lab updates

- In progress: additional optimization of extended PFASs method
  - Increased number of analytes tested (43)
    - Short chain PFCAs (PFBA and PFPeA)
    - Long chain PFCAs (PFTrA and PFTeA)
    - New Generation compounds (Gen-X, ADONA, F53B)
      - new additions to CDC NHANES
    - Additional compounds (PFECHS, 10:2 FtS, PFDPA, FBSA, FDUEA, N-AP-FHxSA)

DTSC Environmental Chemistry Lab updates

- In progress: non-targeted analysis in plasma by using minimal modification from serum method
  - Pilot results from five paired serum and plasma samples show plausibility of approach

Website updates

Designated chemicals list

Chemical groups added:

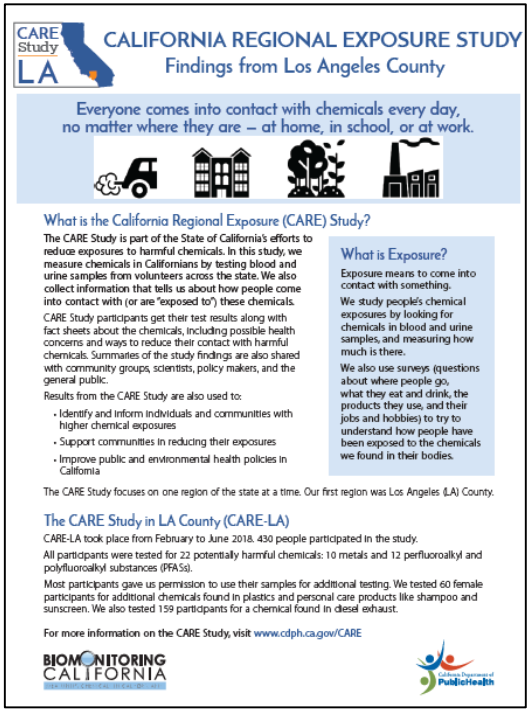
- Aldehydes
- Aromatic amines
- Aromatic diamines
- Sex steroid hormones and binding protein
- Volatile N-nitrosamine compounds

Other additions

- Several VOCs
- Several pesticides
- Nickel
- Updated PFAS definition footnote
  - Also updated in Priority Chemicals list

CARE-3 data

CARE-LA lay-friendly study summary



CARE Study LA

CALIFORNIA REGIONAL EXPOSURE STUDY
Findings from Los Angeles County

Everyone comes into contact with chemicals every day, no matter where they are – at home, in school, or at work.

What is the California Regional Exposure (CARE) Study?

The CARE Study is part of the State of California's efforts to reduce exposures to harmful chemicals. In this study, we measure chemicals in Californians by testing blood and urine samples from volunteers across the state. We also collect information that tells us about how people come into contact with (or are "exposed to") these chemicals.

CARE Study participants get their test results along with fact sheets about the chemicals, including possible health concerns and ways to reduce their contact with harmful chemicals. Summaries of the study findings are also shared with community groups, scientists, policy makers, and the general public.

Results from the CARE Study are also used to:

- Identify and inform individuals and communities with higher chemical exposures
- Support communities in reducing their exposures
- Improve public and environmental health policies in California

What is Exposure?

Exposure means to come into contact with something.

We study people's chemical exposures by looking for chemicals in blood and urine samples, and measuring how much is there.

We also use surveys (questions about where people go, what they eat and drink, the products they use, and their jobs and hobbies) to try to understand how people have been exposed to the chemicals we found in their bodies.

The CARE Study focuses on one region of the state at a time. Our first region was Los Angeles (LA) County.

The CARE Study in LA County (CARE-LA)

CARE-LA took place from February to June 2018. 430 people participated in the study.

All participants were tested for 22 potentially harmful chemicals: 10 metals and 12 perfluoroalkyl and polyfluoroalkyl substances (PFASs).

Most participants gave us permission to use their samples for additional testing. We tested 60 female participants for additional chemicals found in plastics and personal care products like shampoo and sunscreen. We also tested 159 participants for a chemical found in diesel exhaust.

For more information on the CARE Study, visit www.cdph.ca.gov/CARE

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Questions from SGP and public?

Thank you to participants, collaborating organizations, and staff!

Questions for the Panel

- How can the program convey the utility of the new weighted data to stakeholders and other researchers?

- How can the program expand the impact of findings for communities and other stakeholders?

Questions for the Panel

What are the panel's suggestions for expanding collaborations on existing projects and data? Example topics:

- PFASs
  - PFAS profiles (12-32 PFASs) associated with different exposure sources
  - Differences by race/ethnicity and country of origin
- Phenols
  - Racial or ethnic differences
- Metals
  - Providing better guidance for avoiding arsenic exposures
- Mixtures analyses
  - Up to 14 panels per participant in BEST