

The California Teachers Study: Persistent Organic Pollutants and Breast Cancer

Study Background and Preliminary Results

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CANCER PREVENTION INSTITUTE
OF CALIFORNIA

Preventing Cancer. Promoting Life.

Outline

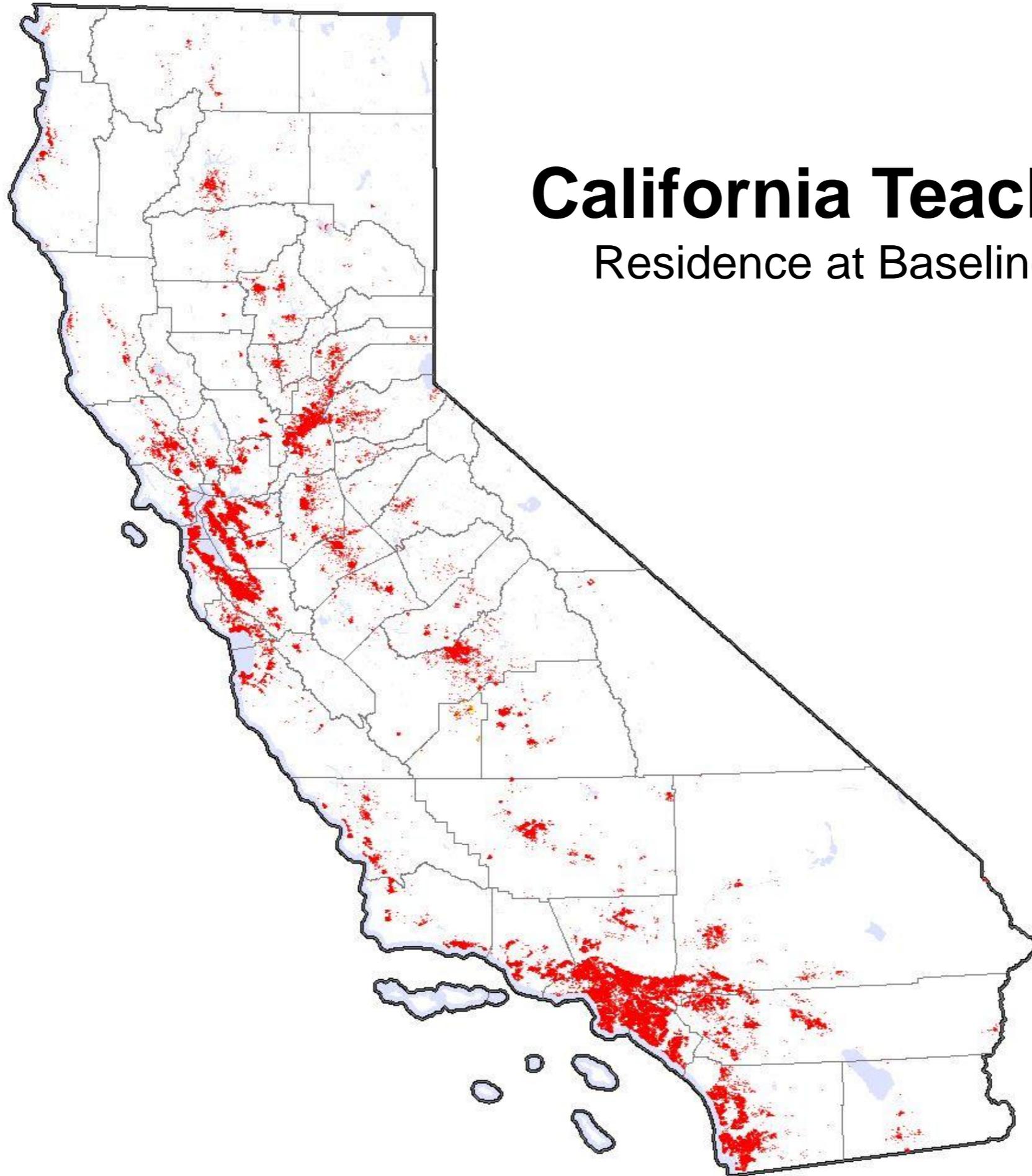
- The California Teachers Study (CTS)
- CTS sub-study (POPs and Breast Cancer)
- Sub-study aims/general protocol
- Chemicals to be analyzed
- Study challenges/strengths
- Preliminary results

CTS Overview

- Statewide cohort of (133,479) female members of the State Teachers Retirement System
- Annual re-contact since inception (1995)
- Periodic questionnaires (every 2 - 3 years)
- Annual outcome follow-up via linkage to Cancer Registry, hospitalization, mortality databases
- Baseline addresses geo-coded
- Initially supported with California Prop-99 funds; subsequently with Federal and State research grants

California Teachers Study

Residence at Baseline (1995-1996)



CTS and Persistent Organic Pollutants (POPs)

A sub-study from the original CTS cohort

CTS and POPs Research Team

❖ Cancer Prevention Institute of California

- Peggy Reynolds, Susan Hurley, David Nelson, Erika Garcia, Andrew Hertz, Julie Von Behren, Pam Horn-Ross, Chris Collins

❖ DTSC Environmental Chemistry Laboratory

- Myrto Petreas, June Soo Park

❖ City of Hope

- Leslie Bernstein

❖ UC Irvine

- Hoda Anton-Culver

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CTS and POPs: Specific Aims

1. Screen for major predictors of PBDEs

- Behavioral factors
- Sociodemographic disparities
- Indoor and outdoor correlates

2. Assess POPs as risk factors for breast cancer

- Use case-cohort design

CTS and POPs:

Aim 1: Predictors of PBDEs/Disparities

- 360 participants targeted:
 - Not known to have breast cancer
 - Oversampled for women of color/rural residence
targeting: 90 White/90 Black/90 Hispanic/90 API
- Data collection (2011-2013):
 - Blood samples
 - Questionnaire re: potential sources of exposure
 - GIS attribute data for residences

CTS and POPs:

Aim 2: POPs and Breast Cancer Risk

- Case-cohort design
 - 1,000 cases and 1,000 controls from CTS nested case-control study
 - Diagnoses 2007-2012
- Data collection (2011-2013)
 - Blood samples
 - Questionnaire re: potential sources of exposure
 - GIS attribute data
 - Genotyping (funded by parent CTS study)

CTS and POPs: Chemicals to be measured in serum

- PBDEs (19)
- PFCs (12)
- PCBs (15)
- Chlorinated Pesticides (7)

- Cholesterol
- Triglycerides
- Thyroid Hormones (T4, TSH)

CTS and POPs: Overcoming a Challenge

- Phlebotomists visit participants throughout the State (home, work)
 - Very difficult to process samples in the field following standard procedure (centrifuge, transfer serum into clean vials, freeze within 24 hrs)
- Pilot study to test alternative sample processing

CTS and POPs: Pilot Study to Address Field Constrains

Can we have more flexibility in the field?

How long can samples be stored frozen?

❖ Type of blood draw tube

- Red Top (RT) requiring centrifuging and lab processing within 24 hrs is the standard method
- Serum Separator Tube (SST) only requires centrifuging in the field

❖ Time between blood draw and processing:

- 2hr vs. 48 hr

❖ Time in lab freezer between processing and analysis:

- 1 month vs. 2 yrs

CTS and POPs: Pilot Study to Address Field Constrains

Blood from 11 volunteers was:

- drawn in 6 tubes (3 RT and 3 SST)
 - processed at different times (2hr vs. 48hr)
 - stored frozen for 1 month (and for 2 years)
 - analyzed for Persistent Organics (OCPs, PCBs, PBDEs, PFCs, BFRs) and lipids
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- No difference between SST-48hr and RT-2hr (standard)
 - SST-48hr can be used for Persistent Organics and lipids in this and future studies
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- Effects of storage for 2 yrs will be examined in Feb 2013

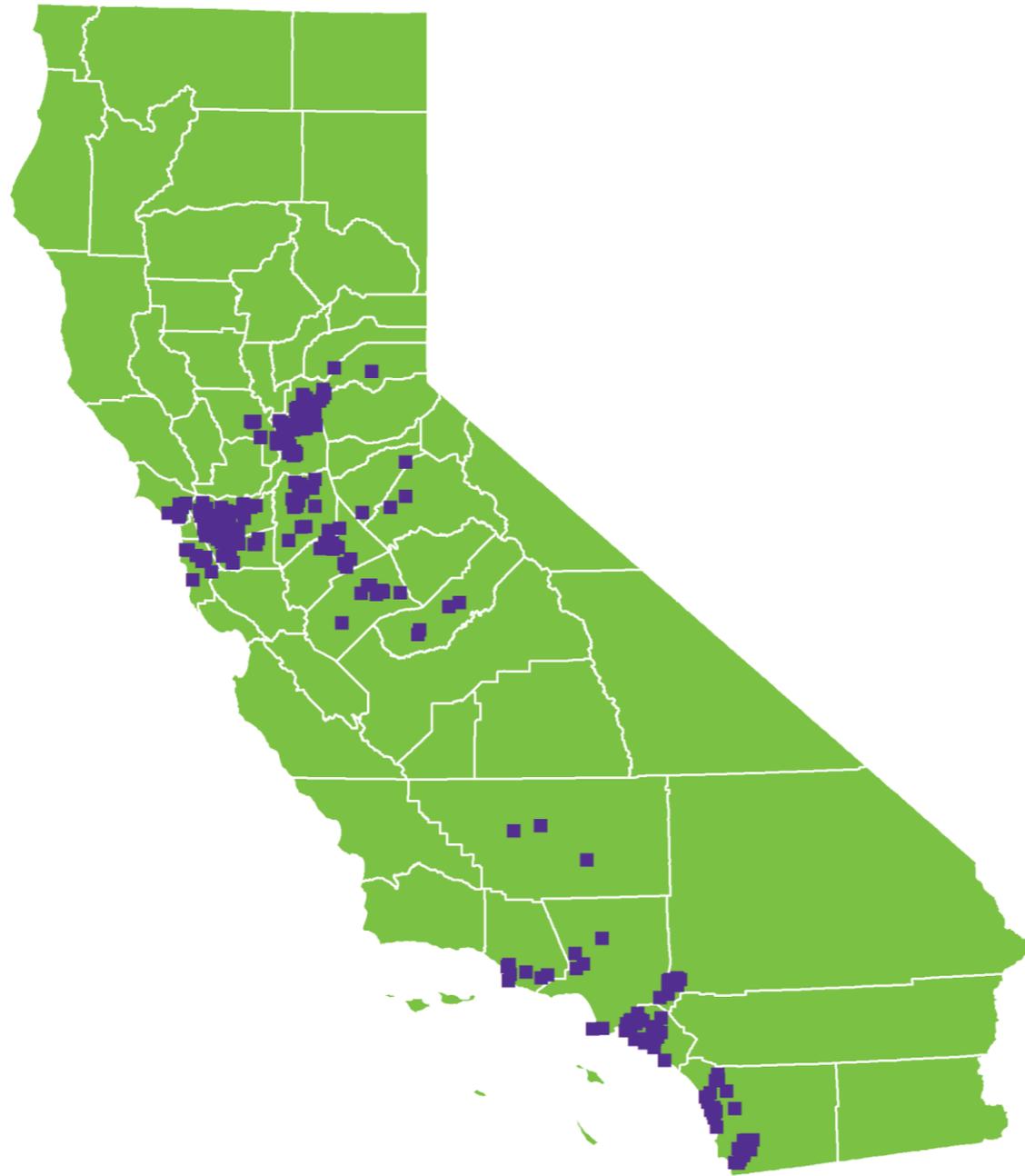
CTS and POPs: Study Strengths

- Large well-defined cohort
 - Statewide - diverse geography
 - Extensive questionnaire information
 - Extensive GIS attribute data
- Independent assessment of outcome
 - Annual linkage to CCR
- State of the art laboratory techniques
- Advanced statistical methods for selecting & ranking variables

CTS and POPs: Preliminary Results

- As of November 1, 2012:
 - 1,510 samples have been shipped to ECL (cases/non-cases)
 - Collection period May 2011-October 2012 (several shipments)
 - 638 samples have been aliquoted for PFC, POPs, lipids
 - 638 samples have been analyzed for lipids
 - 279 samples have been analyzed for PFCs
 - 80 samples have been analyzed for PBDEs
- Analyses underway for remaining samples

CTS and POPs: Location of participants (n=279)



CTS and POPs: Characteristics of participants (n=279)

Age

	N	%
40-49 years	15	5%
50-59 years	40	14%
60-69 years	95	34%
70+ years	129	46%
Total:	279	100%

Race/ethnicity

	N	%
White	206	74%
Black	29	10%
Hispanic	21	8%
Asian/Pacific Islander	19	7%
Other	4	1%
Total:	279	100%

**Mean age = 68 years;
Range = 40 to 94 years**

CTS and POPs:

Major PFCs (ng/mL) in participants (n=279)

	PFOS	PFOA	PFNA	PFHxS	PFDeA	PFUdA
% Detection Frequency	99.6	99.6	100	100	90.3	99.3
min	<0.08	<0.30	0.16	0.05	<0.03	<0.01
max	73.7	27	9.7	17.4	3.91	1.31
median	7.86	2.62	1.0	1.67	0.24	0.16
GM	7.57	2.65	1.0	1.71	0.21	0.14
NHANES Females >20yrs GM 09-10	7.79	2.70	1.44	1.21	0.27	0.18

CTS and POPs:

Minor PFCs (ng/mL) in participants (n=279)

	PFOSA	Me-PFOSA-AcOH	Et-PFOSA-AcOH	PFHpA	PFDoA	PFBuS
% Detection Frequency	97.5	100	91.4	56.3	27.2	21.9
min	<0.01	0.02	<0.01	<0.06	<0.03	<0.02
max	1.24	9.2	1.36	0.73	1.57	0.21
median	0.07	0.24	0.05	0.07	<0.03	<0.02
GM	0.08	0.28	0.05	*	*	*
NHANES Females >20yrs GM 09-10	*	0.19	*	*	*	*

* Not calculated: Proportion of results below the limit of detection was too high to provide a valid result.

CTS and POPs: Future Steps

- Complete Pilot Study by evaluating freezing for 2 years (February 2013)
- Continue recruitment to end of 2013
- Continue sample analyses
- Periodically post aggregate results to Biomonitoring California website

CTS and POPs: Biomonitoring California

- Statewide recruitment
- Special demographic (women, mostly over 60 yrs old)
- Collaborative effort with CPIC
- Partially funded by CBCRP

- Blood draw in SST found equivalent to standard Red Tops
 - Can be used in other studies

- CTS data to complement data from other studies (FOX, MIEEP, BEST), expanding our data base.

- Model for future collaborations to sustain Program