Update on MAMAS and other Projects

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Scientific Guidance Panel Meeting

July 16, 2015 – Oakland, CA

- Program updates/announcements
- Project updates
- Measuring Analytes in Maternal Archived Samples (MAMAS)
  - Project overview
  - Round 1 data presentation

Program Announcements

- Program funding
  - 2015-16 budget includes $800K two-year augmentation
  - Biomonitoring California budget comprised of:
    - Permanent state funding
    - CDC cooperative agreement
    - 2014-16 augmentation
    - 2015-17 augmentation

- Biomonitoring team updates
  - Dr. Yu-Chen Chang joined EHL

Biomonitoring Staff

Jeffrey Aduviso	Laura Fenster	Duyen Kauffman	Dan Sultana
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	Erika Houtz	Martin Snider	Wei Zou
Dina Dobraca	Lauren Joe		
Amy Dunn			

Project Updates

- Pilot BEST
  - On-going data analyses
  - Evaluation of results return
  - Posted results on website for: PCBs, PAHs, organochlorine pesticides, pyrethroid pesticide metabolites

- Expanded BEST
  - Received lab results for 2nd set of chemicals: environmental phenols, PAHs, phthalates, pesticides, and metals (in urine), and POPs (in serum)
  - Round 2 results return planned for August
  - Data analyses (metals, PFCs)

Proposed Studies

- Flame Retardant and Environmental Exposure Study (FREES):
  - Collaboration with the UC Davis, Environmental Working Group, Green Science Policy Institute, and Silent Spring Couch and Foam Cushioning Replacement Study
  - Participants will remove or replace flame retardant-containing foam in the home
  - UC Davis study will look at FR levels in dust
  - Biomonitoring California will look at FR levels in blood and urine

Proposed Studies *(2)*

- Asian/Pacific Islander Community Exposures (ACE) Project
  - Collaboration with APA Family Services
  - Community-based study to biomonitor Chinese, Vietnamese, Filipino, and Lao populations in San Francisco and conduct education and outreach related to safe fish consumption
  - Project will fill data-gap related to specific Asian sub-populations

Measuring Analytes in Maternal Archived Samples (MAMAS)

- Review of Biobank
- MAMAS-1 pilot sampling
- MAMAS-2 statewide expansion
- Benefits and challenges

California Biobank

Genetic Disease Screening Program (GDSP)

Biobank counties: Fresno, Kern, Kings, Madera, Tulare, Orange and San Diego

MAMAS Pilot Study

	Phase I	Phase II
Number of Samples	460	540
Source	Biobank: San Diego County Orange County	GDSP (non-Biobank): -Los Angeles -Riverside & San Bernardino Counties -Alameda & Contra Costa Counties -Northern Tier
Year	2012	2015
Sample volume	Approx. 0.5 mL	Approx. 1 mL
Analytes	Metals (200) PFCs (200) POPs (60)	Metals/PFCs (440) POPs (100)
Status	Laboratory analysis complete Data analysis in progress	Samples scheduled to arrive July – Dec 2015

MAMAS – Phase II samples will be pulled from four geographic regions: Los Angeles County; San Bernardino & Riverside Counties; Contra Costa & Alameda Counties; and the Northern Tier

Measuring Analytes in Maternal Archived Samples (MAMAS): Demographics

- Pregnant women
- San Diego and Orange Counties

- Selected by race/ethnicity
- Asian subgroups with n>30: Chinese, Filipino, Vietnamese

- Consistent second trimester sampling

		N (460)	%
Age			
	<25	87	18.9
	25-35	305	66.3
	>35	68	14.8
Race/Ethnicity			
	White	120	26.1
	Black	120	26.1
	Hispanic	120	26.1
	Asian	100	21.7
Medi-Cal			
	No	327	71.1
	Yes	133	28.9

MAMAS chemicals

- Metals
- Perfluorochemicals (PFCs)
- Persistent Organic Pollutants (POPs):
    - Organochlorine pesticides (OCPs)
    - Polychlorinated biphenyls (PCBs)
    - Polybrominated diphenyl ethers (PBDEs)

	MAMAS Phase I	MAMAS Phase II	MIEEP (2010-11)	NHANES *(cycle)*
Metals	200	440	77	Limited for blood
PFCs	200	440	77	17 (2011-12)
POPs	58	100	77	67-71 (2003-04)

MIEEP: Maternal and Infant Environmental Exposure Project

PFC detection frequencies

PFC*	Percent detected, sorted by MAMAS (%)		
	CTS	FOX	MAMAS
PFHxS	100	100	**100**
PFNA	100	100	**100**
PFOA	99.9	100	**100**
PFOS	99.9	100	**100**
PFHpA	75.9	75.2	**83.5**
PFDeA	94.2	100	**83**
Me-PFOSA-AcOH	98.5	100	**79.5**
PFUA	96.8	100	**78**
PFOSA	69.6	95	**33.5**
Et-PFOSA-AcOH	85.9	65.3	**29**
PFDoA	10.3	0	**8**

CTS: California Teachers Study
FOX: Firefighter Occupational Exposures Project

*Description of PFCs: http://biomonitoring.ca.gov/chemicals/perfluorochemicals-pfcs
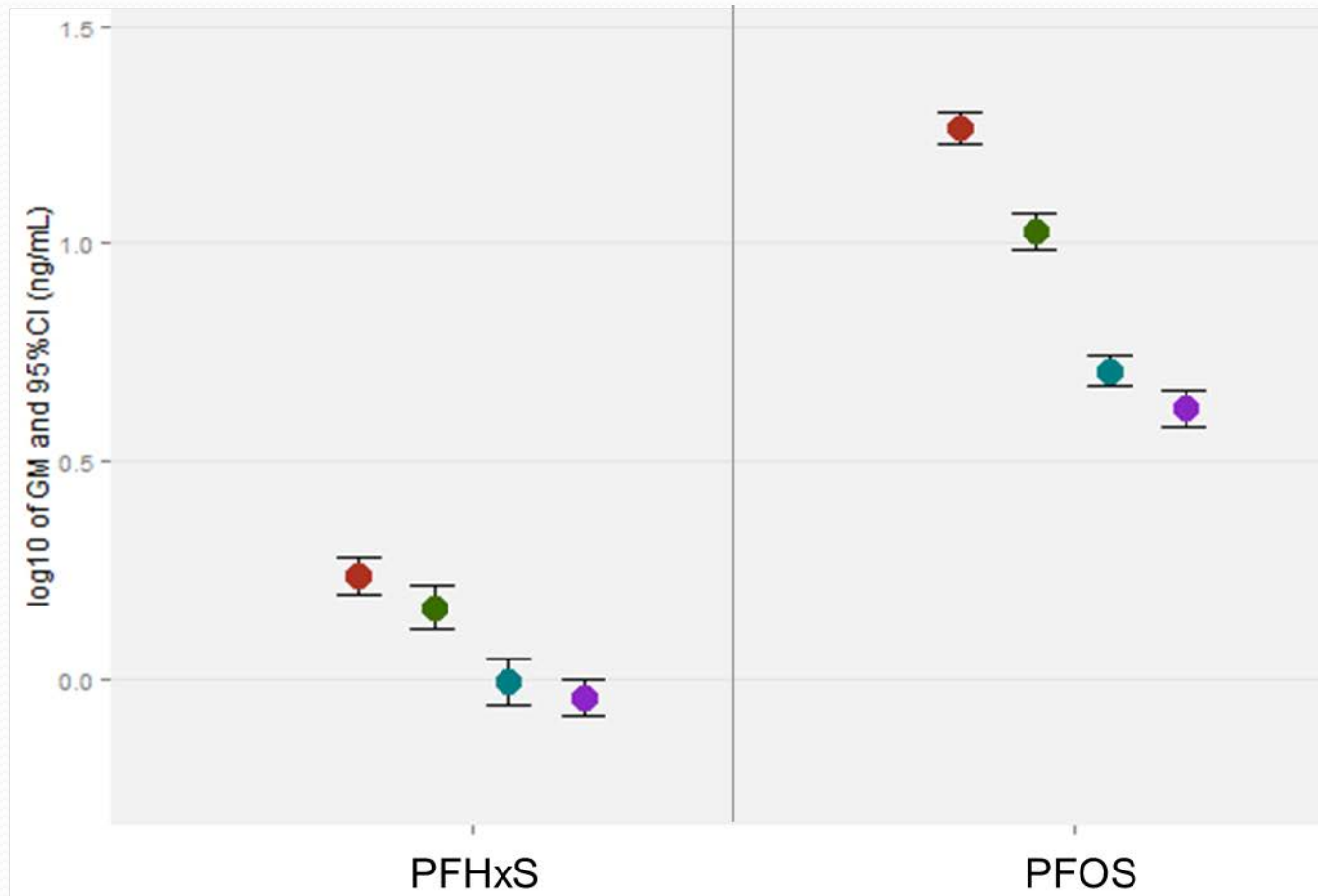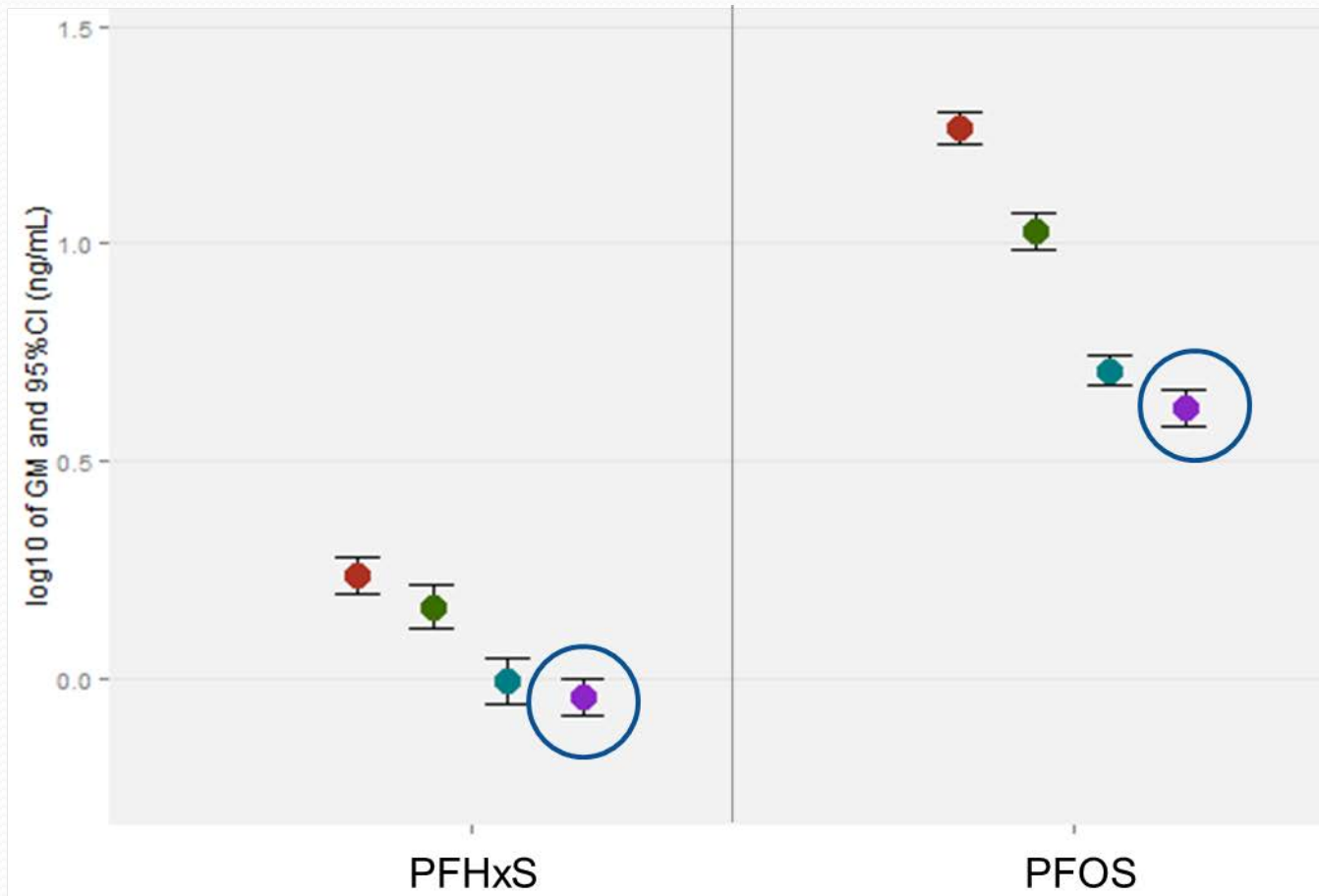
PFHxS and PFOS in MAMAS and NHANES*

* NHANES is females, all ages.

PFHxS and PFOS in MAMAS and NHANES*
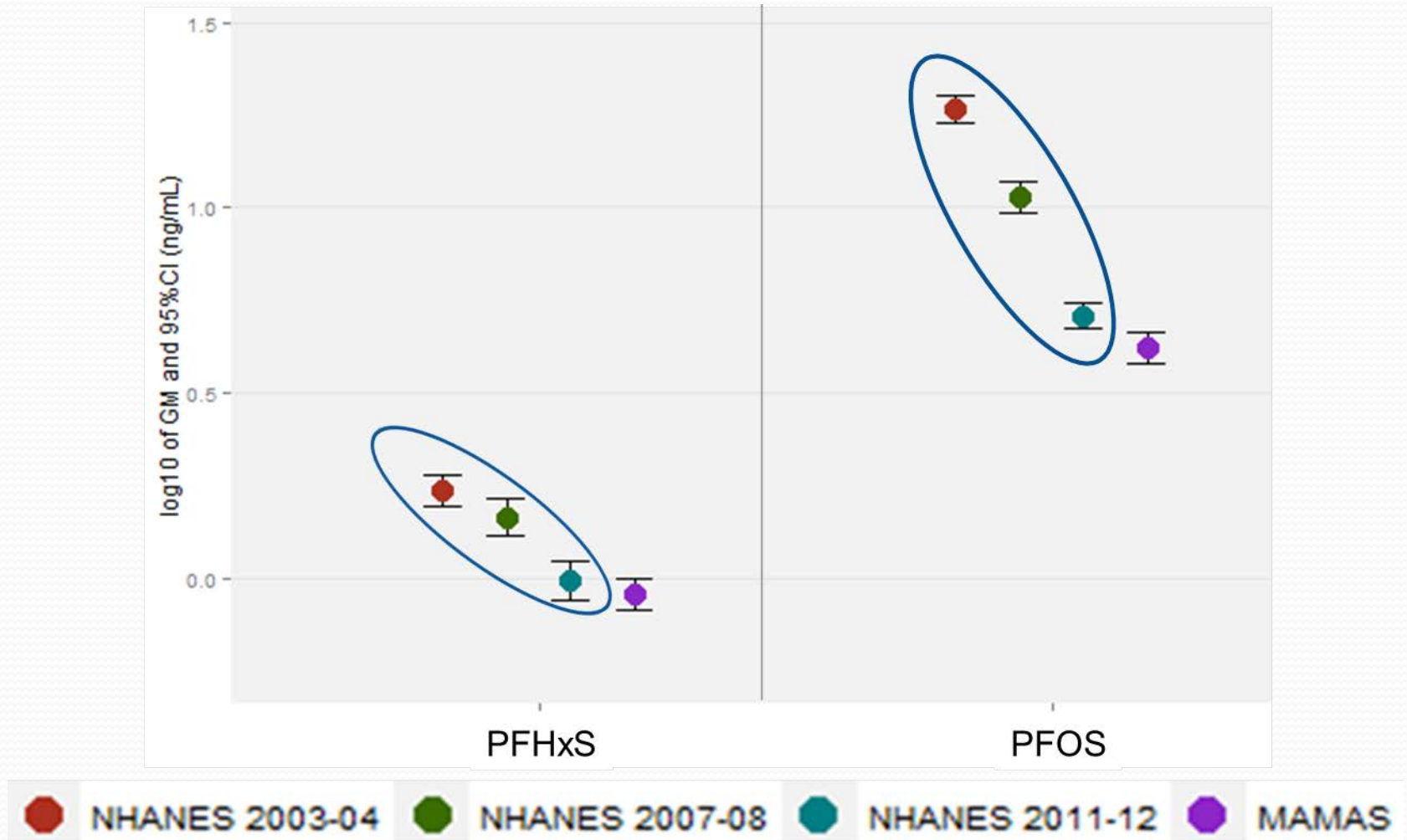
* NHANES is females, all ages.

PFHxS and PFOS in MAMAS and NHANES* *(2)*

* NHANES is females, all ages.
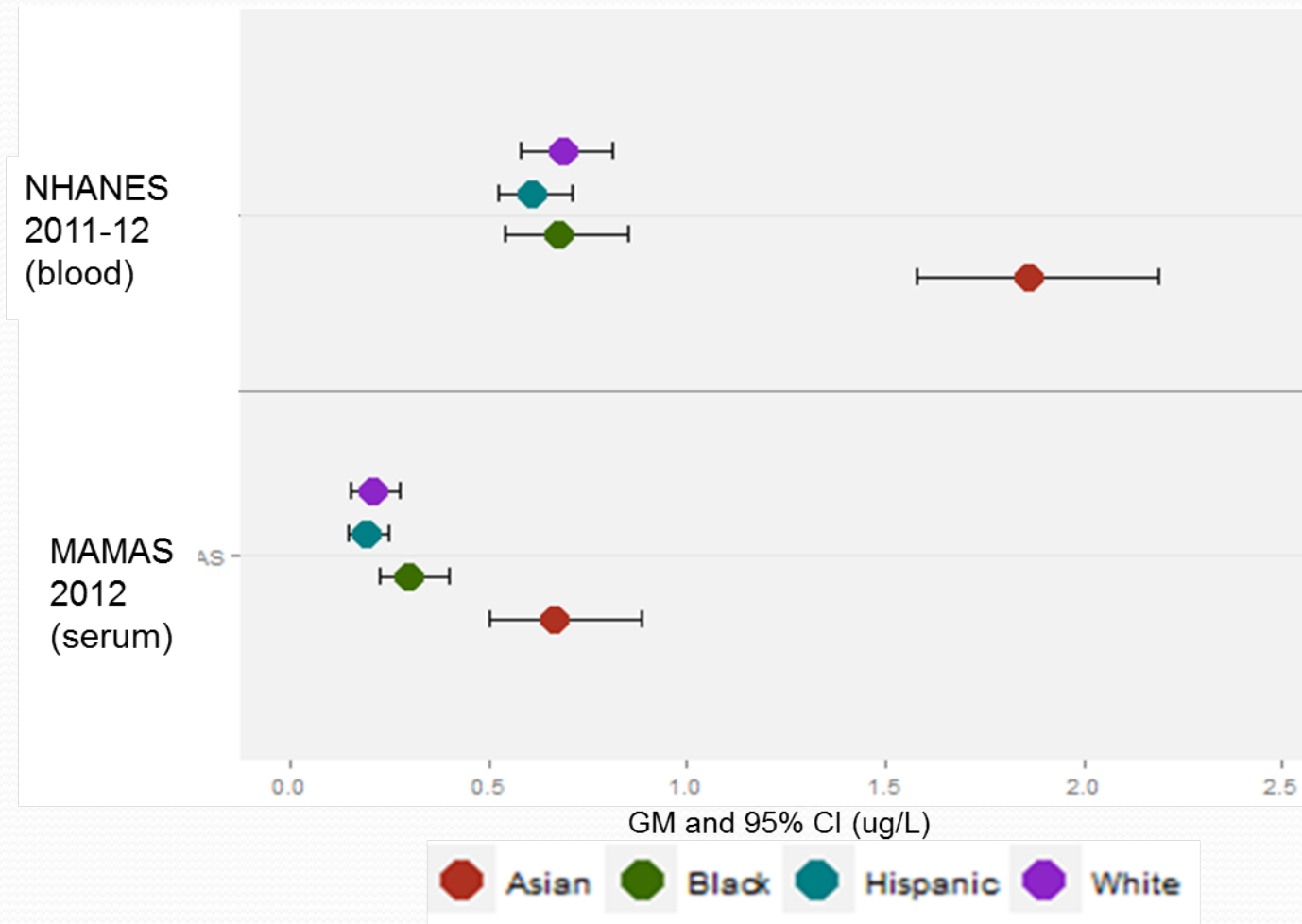
Metals results

- Currently can report Hg, Mo, Se, Sr, and Tl

- Metal contamination in collection tubes
  - Two blank studies completed
  - Affects As, Cd, Co, Cr, Mn, Pb, Sb, U, and possibly others

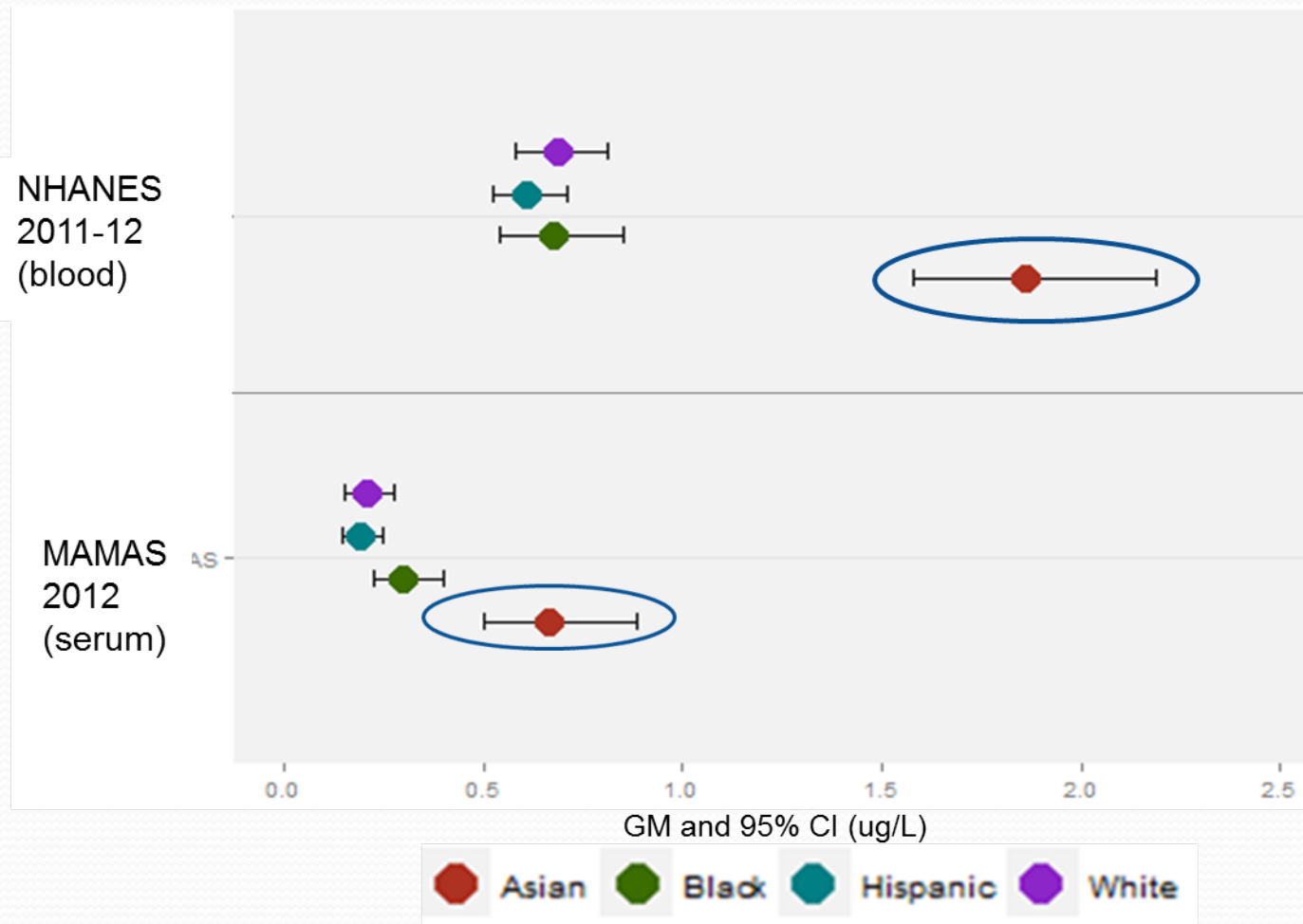| Detection frequencies (%) for MAMAS serum metals	
Hg	99
Mo	100
Se	100
Sr	100
Tl	100

Mercury by race in MAMAS and NHANES

Note: NHANES 2011-12, total blood mercury for all females.

Mercury by race in MAMAS and NHANES *(2)*

Note: NHANES 2011-12, total blood mercury for all females.

POPs detected in MAMAS

- Congeners shown were detected in at least 40% of samples

- DFs and GMs were less than NHANES (2003-04)*

	DF(%)
HCB	100
DDE	100
BDE-47	75.9
BDE-99	43.1
BDE-100	62.1
BDE-153	63.8
BDE-183	74.1
PCB-118	69.0
PCB-138	67.2
PCB-153	91.4
PCB-170	63.8
PCB-180	82.8

Note: *NHANES 18-45 year aged, overall and pregnant subgroups.

POPs detected in MAMAS *(2)*

- Congeners shown were detected in at least 40% of samples

- DFs and GMs were less than NHANES (2003-04)*

- Exception: BDE-183
  - DFs in CTS and FOX < 5%

	DF(%)
HCB	100
DDE	100
BDE-47	75.9
BDE-99	43.1
BDE-100	62.1
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BDE-183	74.1
PCB-118	69.0
PCB-138	67.2
PCB-153	91.4
PCB-170	63.8
PCB-180	82.8

Note: *NHANES 18-45 year aged, overall and pregnant subgroups.

PBDEs: Consistent with recent studies

GM or other comparison values (ng/g lipid)				
Congener	MAMAS (2012)	MIEEP (2010-11)	CTS (2011)	FOX (2010-11)
BDE-47	13.7	9.56	14.1	32.2
BDE-99	*Median=4.3 (df=43%)	**Median=2.7	(df=42%)	6.19
BDE-100	2.8	2.17	2.46	5.68
BDE-153	6.49	2.64	5.46	15.4
BDE-183	4.2	---	---	---

*Values shown for context only; not statistically valid due to low DF
**DF not reported

MAMAS: 3 POPs by race

Log10 of GM and 95%CI (ng/g lipid)

● Black ● Hispanic ● White
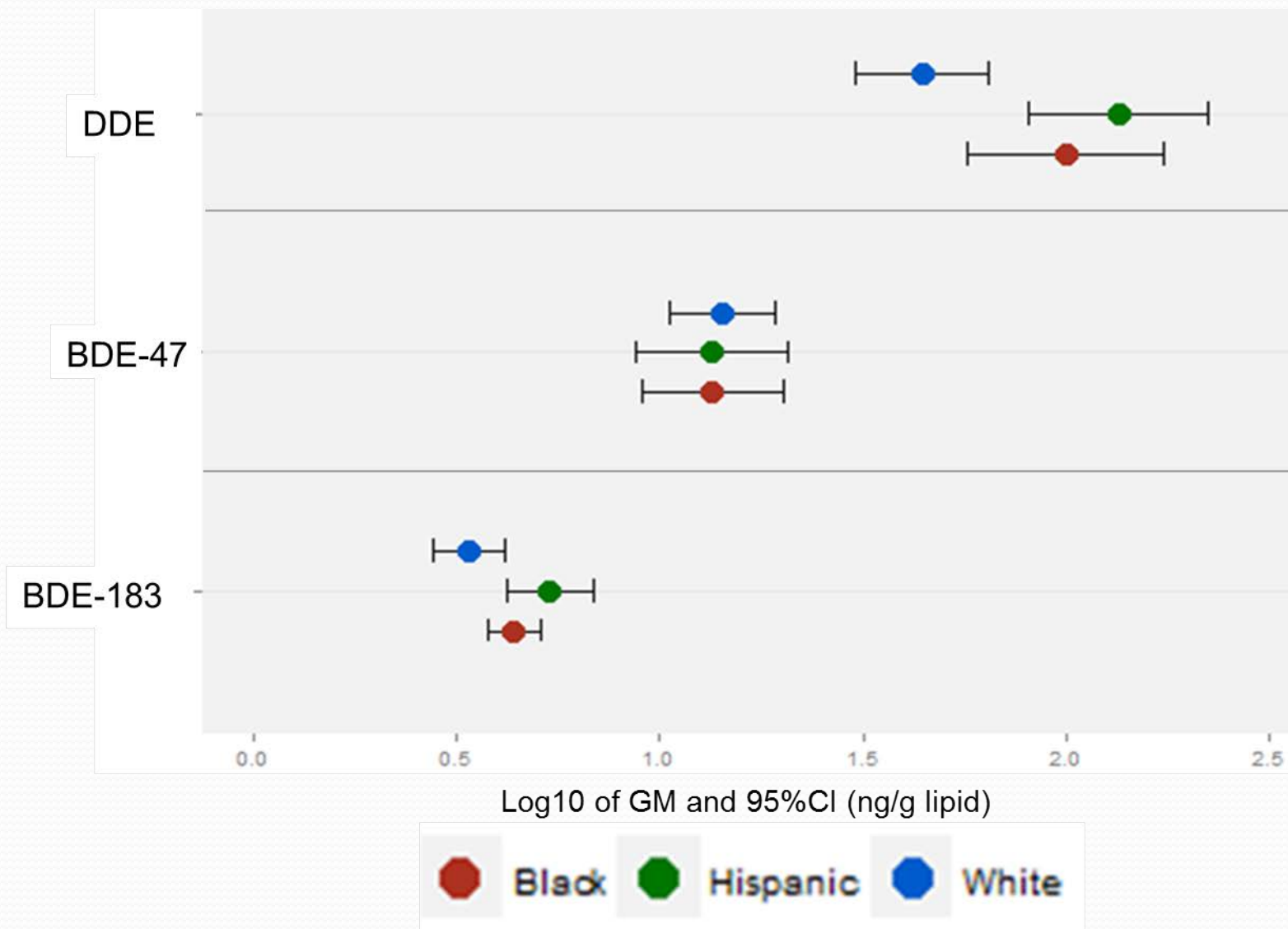
MAMAS:
Potential for state-wide sampling

Benefits

- Inexpensive
- Representative racially and geographically
- Samples can be fairly large
- Continuous sampling stream might facilitate timely surveillance (limited by other project timelines)

Challenges

- Serum only, limited sample volume
- Limited representation of CA: pregnant women
- Additional, specific bias:
  - Only those achieving pregnancy
  - Likely omits higher risk pregnancies
  - Omits older and younger women
- No exposure histories possible
- No control over sampling protocol

Future directions for MAMAS

Next steps:

- Combine with MAMAS II
- Continue to assess metals strategy

Future possibilities:

- Changes over time in California
- Sentinel monitoring of emerging chemicals
- Retrospective investigation in Biobank counties