

Report to Scientific Guidance Panel



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Overview

- Staff changes
- Project sample analyses status
- MIEEP study results
- Exploring identifying unknowns /
untargeted analysis
- Future work

Staff Changes

New Staff

- Dr. Simon Ip - Research Scientist II
 - Previous Association of Public Health Laboratories (APHL) fellow
 - Hydroxy-PAHs, low volume blood & dried blood spots methods
- Xirui Wang - Environmental Chemist
 - Perchlorate in urine method
- Dr. Yu-Chen Chang - Environmental Laboratory Scientist II
 - Currently validating on-line SPE method

Project Sample Analyses Status

Methods in Production	MIEEP (blood n=136) (urine n=89)	FOX (blood n=101) (urine n=101)	Pilot BEST (blood n=110) (urine n=109)
Metals in blood	136	101	110
Creatinine	89	101	109
Phthalate metabolites	89	101	109
OP specific metabolites, pyrethroids & herbicides	89	101	109
Environmental phenols	89	101	90
OH-PAHs	88	101	94
Metals in urine	89	101	20
Arsenic speciation*	13	32	0
Perchlorate	not requested	not requested	60

*Samples are only analyzed if total arsenic levels are ≥ 20 ppb

MIEEP & NHANES:



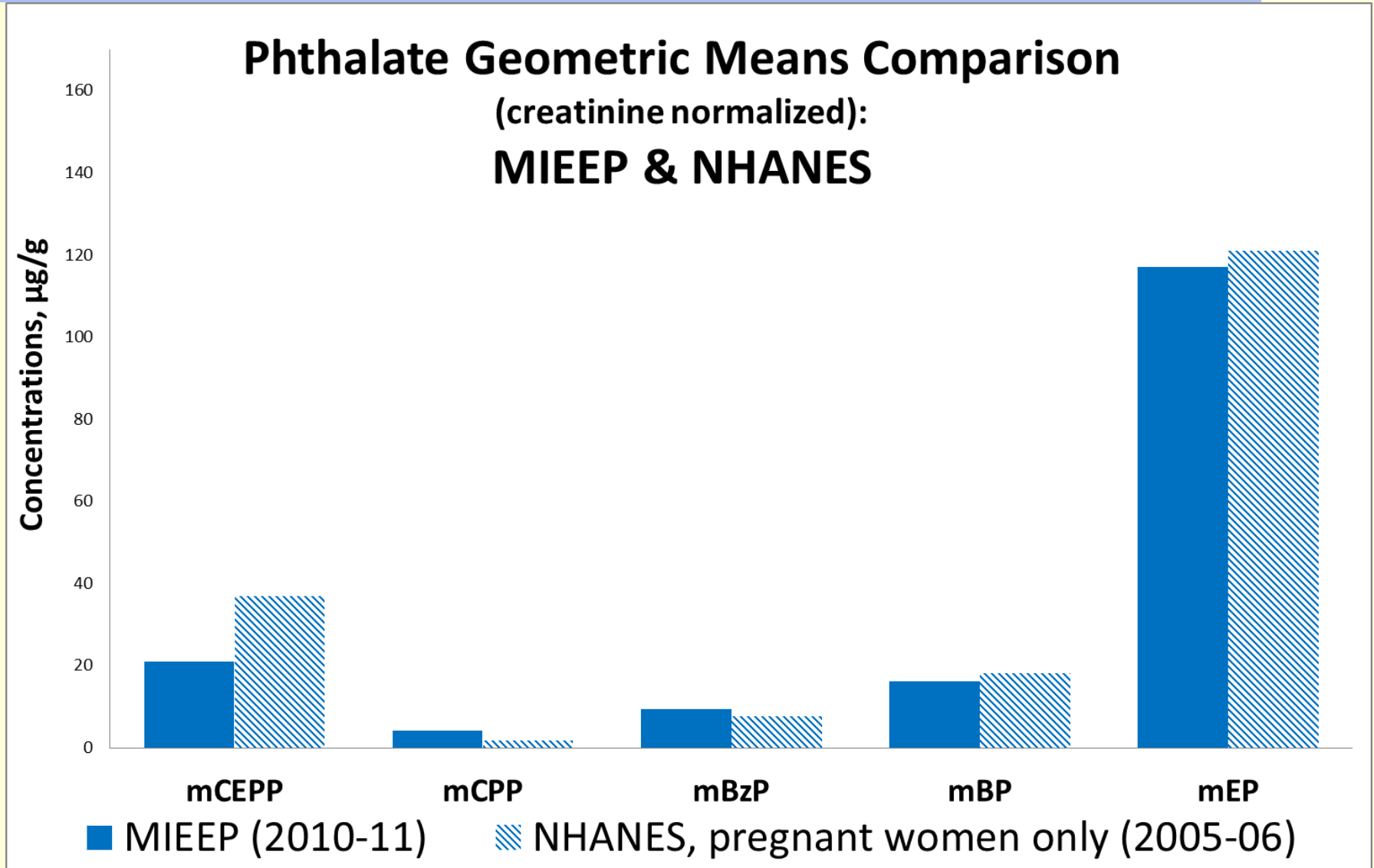
Phthalate Geometric Mean Comparison

Analyte / Urinary Metabolite	Geometric Mean (95% Confidence Interval), $\mu\text{g/g}$		Detection Frequency %	
	MIEEP	NHANES	MIEEP	NHANES
mCEPP	21.0 (17.4-25.3)	36.9 (21.4-63.7)	100	100
mCPP	4.22 (3.65-4.87)	1.76 (1.24-2.49)	100	87.7
mBzP	9.48 (7.54-11.9)	7.72 (5.42-11.0)	100	95.6
mBP	16.1 (13.0-20.5)	18.3 (13.2-25.2)	97.8	95.7
mEP	117 (88.4-155)	121 (88.2-166)	91.0	100

MIEEP (2010-11) n=89

NHANES, pregnant women only (2005-06) n=129

Phthalate Geometric Mean Comparison



MIEEP & NHANES:

OH-PAH Geometric Mean Comparison

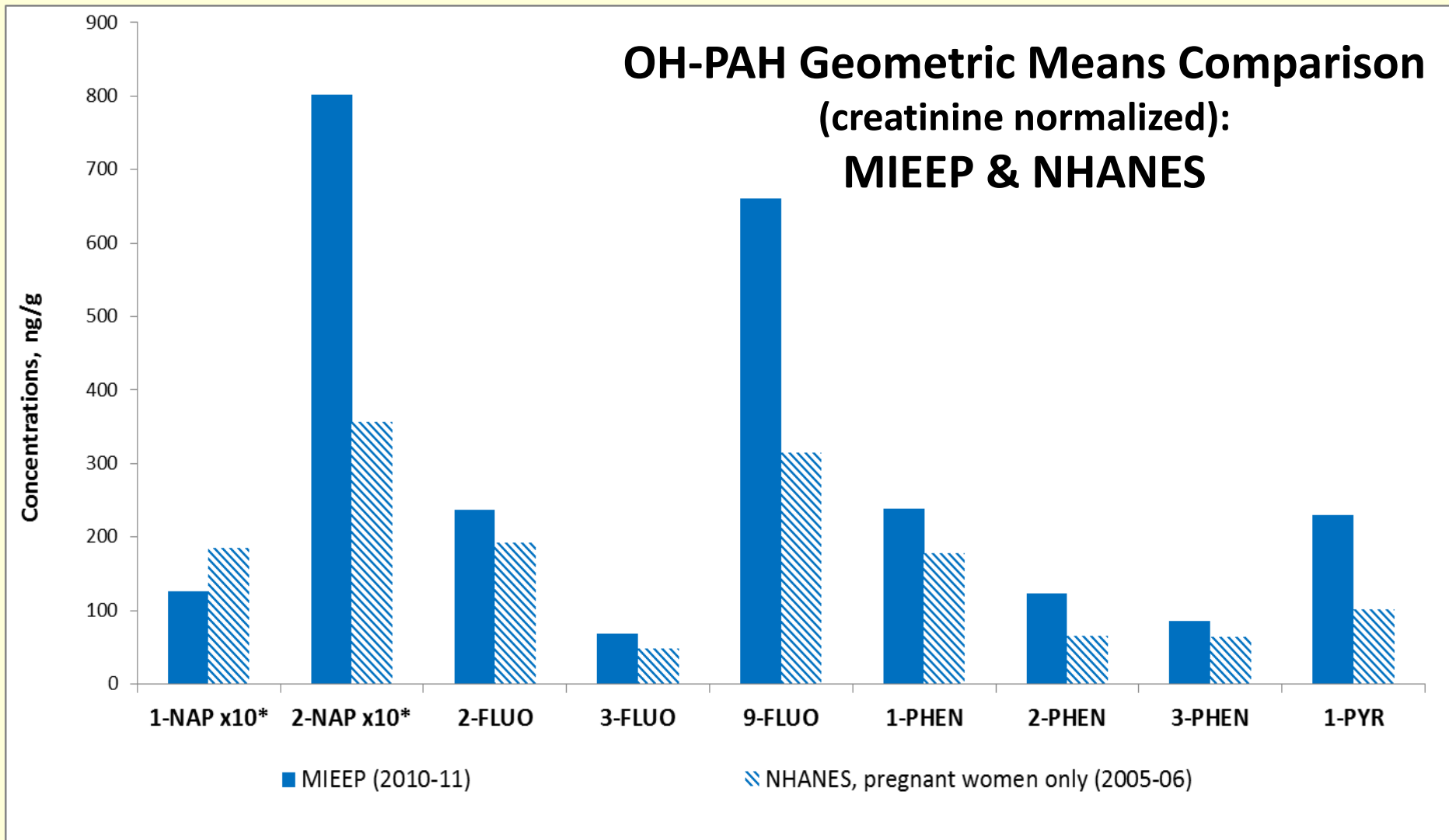


Analyte / Urinary Metabolite	Geometric Mean (95% Confidence Interval), ng/g		Detection Frequency %	
	MIEEP	NHANES	MIEEP	NHANES
1-NAP	1260 (1030-1550)	1850 (1070-3210)	100	99.9
2-NAP	8010 (6830-9410)	3570 (2540-5010)	100	100
2-FLUO	238 (207-272)	192 (167-220)	100	100
3-FLUO	67.7 (57.4-79.8)	48.2 (41.8-55.6)	85.2	98.6
9-FLUO	661 (571-765)	315 (252-395)	100	100
1-PHEN	238 (211-269)	178 (147-215)	100	100
2-PHEN	123 (109-139)	65.9 (52.4-82.9)	100	99.3
3-PHEN	85.7 (75.2-97.7)	63.5 (52.2-77.2)	100	99.1
1-PYR	230 (204-259)	102 (78.8-132)	98.9	99.5

MIEEP (2010-11) n=88

NHANES, pregnant women only (2005-06) n=119-123

OH-PAH Geometric Means Comparison



*OH-PAH values are scaled as indicated

MIEEP & NHANES: Different Study Designs

MIEEP (2010-2011)

- Convenience sample of pregnant women who sought prenatal care at a public hospital in San Francisco, CA

- All urban participants

- Participants are 70% foreign-born
- Over 70% of participants are Latina

NHANES (2005-2006)

- Nationally representative survey that included a subset of pregnant women

- Mix of urban and rural participants

- Small number of pregnant participants, which makes it difficult to subset by race/ethnicity and still have enough statistical power

*Additional analyses are underway to further explain the differences observed between MIEEP and NHANES findings.

Workflow for Identifying Unknowns

Sample spectrum (input)



Library search



Good matches (yes)



Stop

“ASES/MS: An Automatic Structure
Elucidation System for Organic Compounds
Using Mass Spectrometric Data”
Zhu, She, et al. (1988)

Workflow for Identifying Unknowns

Good matches (no)



Molecular weight predictor



Molecular formula generator



Spectrum simulator



Structure evaluation



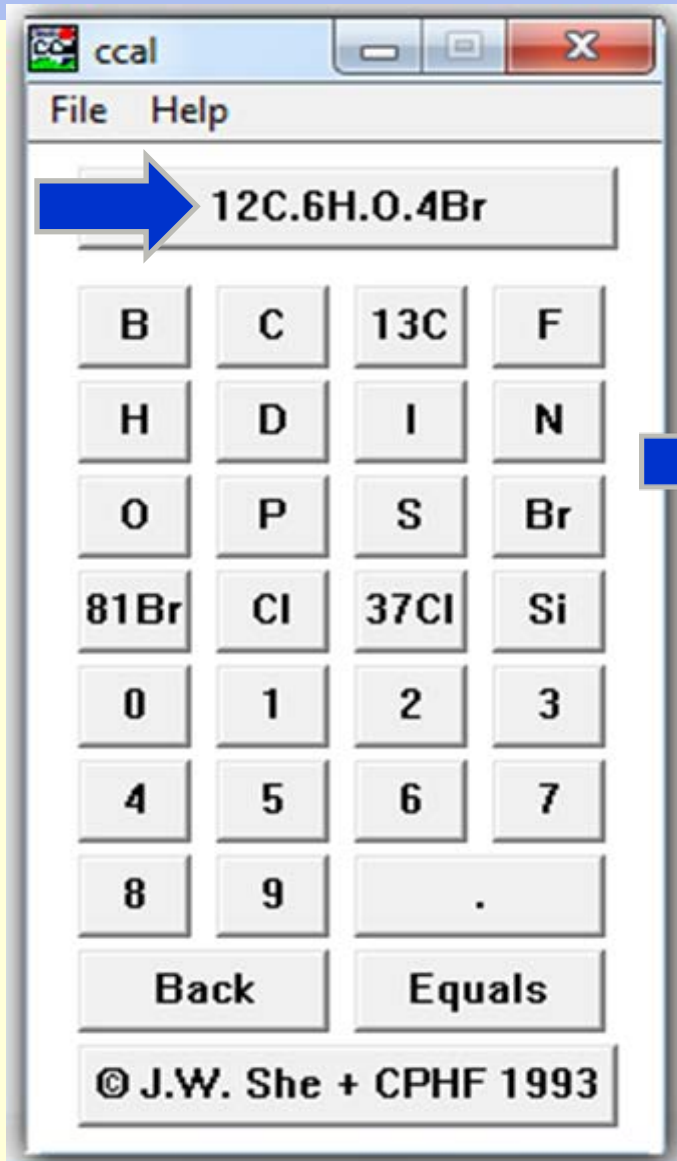
Ordered list of candidates

Rules of isotopic abundance

Rules of neutral losses

Rules of ion formation

Identifying Unknowns - Background



Isotope Pattern Calculator

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12C.6H.O.4Br.

Mass	abs frequency	rel frequency
481.7152	5.7552716e+21	17.4862333
482.7186	7.8263754e+20	2.3778865
483.7132	2.2454736e+22	68.2241914
484.7165	3.0487068e+21	9.2628814
485.7112	3.2913158e+22	100.0000000
486.7145	4.4567906e+21	13.5410606
487.7092	2.1536168e+22	65.4333078
488.7125	2.9009782e+21	8.8140379
489.7074	5.3771226e+21	16.3373038
490.7105	7.1328720e+20	2.1671795
491.7133	5.4070747e+19	0.1642831
492.7159	3.0299722e+18	0.0092060

Identifying Unknowns – Instrumentation

- Hardware
 - High Resolution Mass Spectrometer: Exactive Plus
 - HPLC: Dionex Ultimate 3000
- Software
 - Tracefinder
 - Mass Frontier
 - Additional libraries?!?



Future Work

- Validate on-line SPE method to improve sample through-put
- Submit all data results for Pilot BEST to EHIB
- Continue to develop BPA analogs and derivatives method
- Complete instrumentation installation for identifying unknowns