Race & phthalates: disparities in exposure & effect

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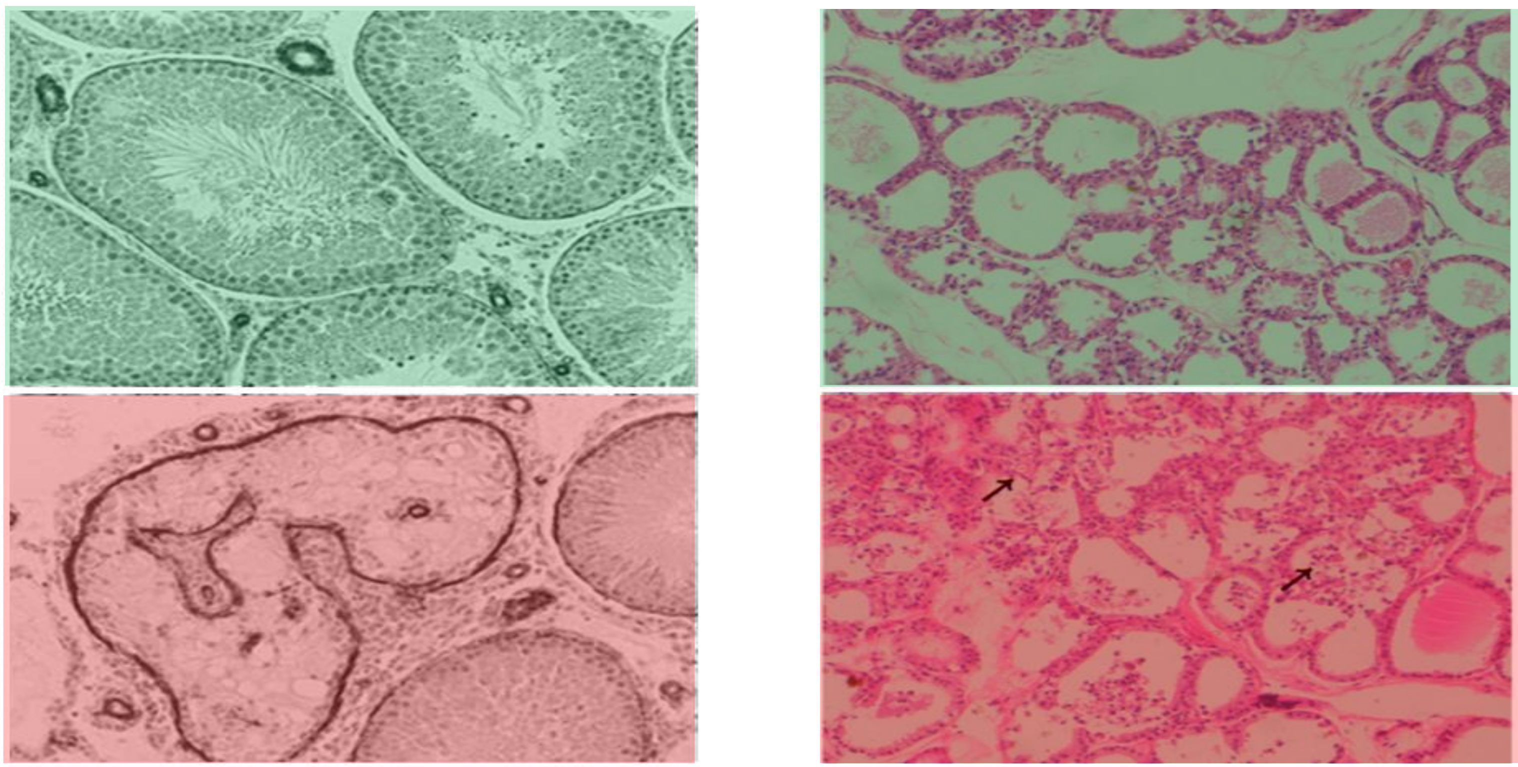
Phthalate diesters are non-persistent chemicals used widely in plastics & personal care products

Calafat et al., Curr Epidemiol Rep 2016;3:145-153; Schettler, Int J Androl 2006;29:134-139; Woodruff et al., Environ Health Perspect 2011;119:878-885

Some phthalates are endocrine disrupting chemicals in experimental models



Testis

Thyroid

Dong et al., Int J Environ Res 2017;14:44; Sharpe, Best Pract Res Clin Endocrinol Metab 2006;20:91-110

Reproductive Development Study to extend links of endocrine disruptors & fetal development

- Associations between phthalates & birth outcomes
- Associations between phthalates & fetal genital development
- Impacts of race & sex as modifying factors
- Sources of exposure to endocrine disruptors

Data

Thank you to colleagues!
Roger Newman, John Brock, John Kucklick,
Abby Wenzel, Rebecca Wineland, Elizabeth Unal & Lori Cruz

Bloom et al, Environ Int 2019;127:473-486; Wenzel et al. Environ Int 2018;110:61-70; Wenzel et al., Chemosphere 2018;193:394-402: Wenzel et al., Chemosphere 2021;262:128369; Wineland et al., Prenat Diagn 2019;39:209-218

Participants were enrolled in the Reproductive Development Study from 2011 to 2014

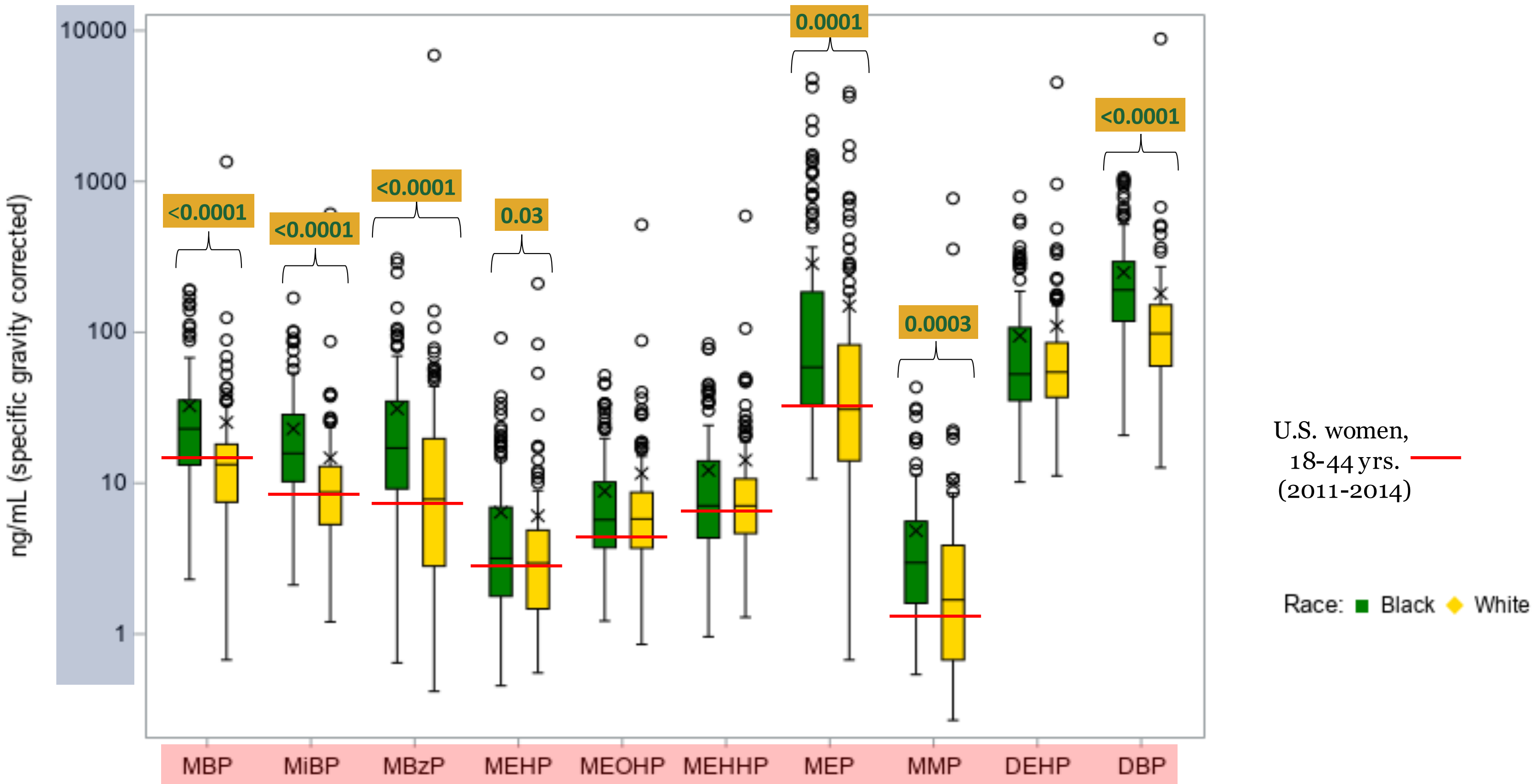
T_1: 18-22 weeks
(n = 391)
- Questionnaire
- Urine
- Blood

T_2: 24-32 weeks
Median = 8.6 weeks
(n = 219)
- Urine

T_3: 25-43 weeks
(n = 319)
- Urine
- Blood
- Cord blood

Black
or white
(n = 310)

Black women had higher phthalate levels than white women

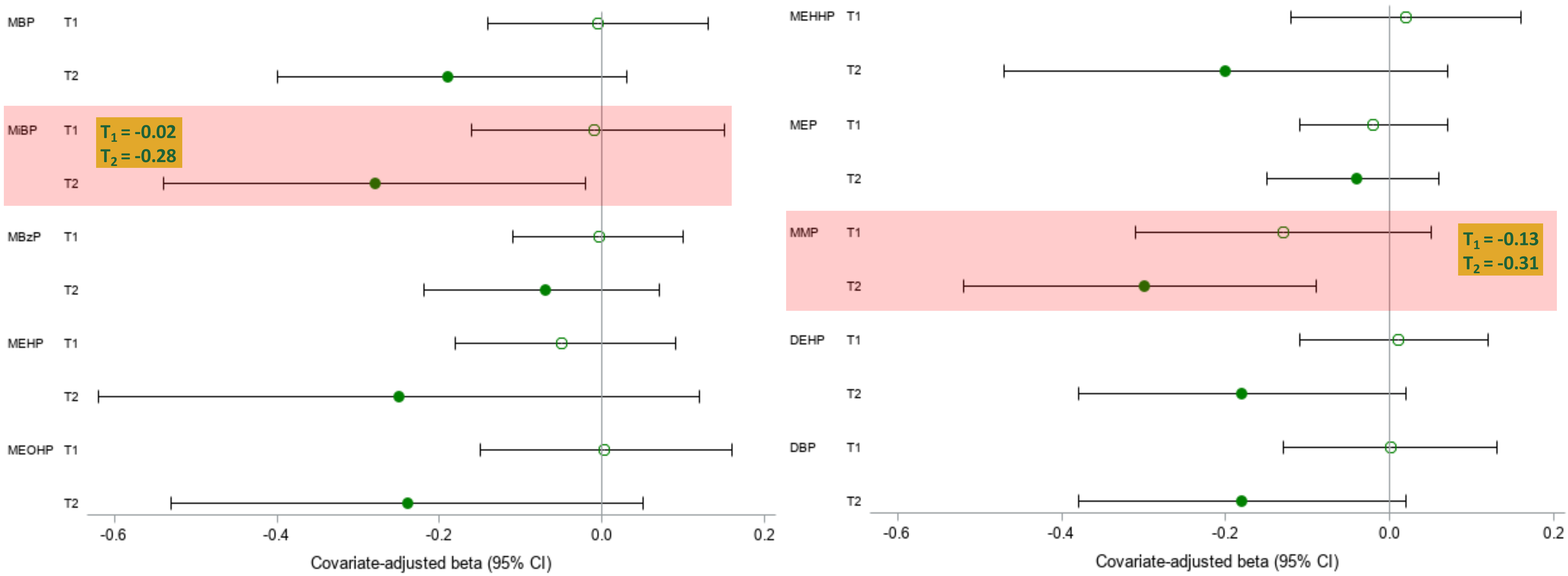


Black women delivered earlier & with lower birth weight newborns than white women

Outcome	n	%	Mean	Min	Median	Max	P-value (race)
Gestational age (wks.)	310	-	38.8	25.1	39.1	43.0	**0.01**
Preterm birth	28	9.4	9.5%	-	-	-	0.91
Birth size							
Birth weight (g)	308	-	3285.0	1125.0	3253.0	5020.0	**<0.0001**
Low birth weight	19	6.2	8.0%	-	-	-	0.08
Small for gestational age	33	10.7	-	-	-	-	**0.01**

Bloom et al,, Environ Int 2019;127:473-486

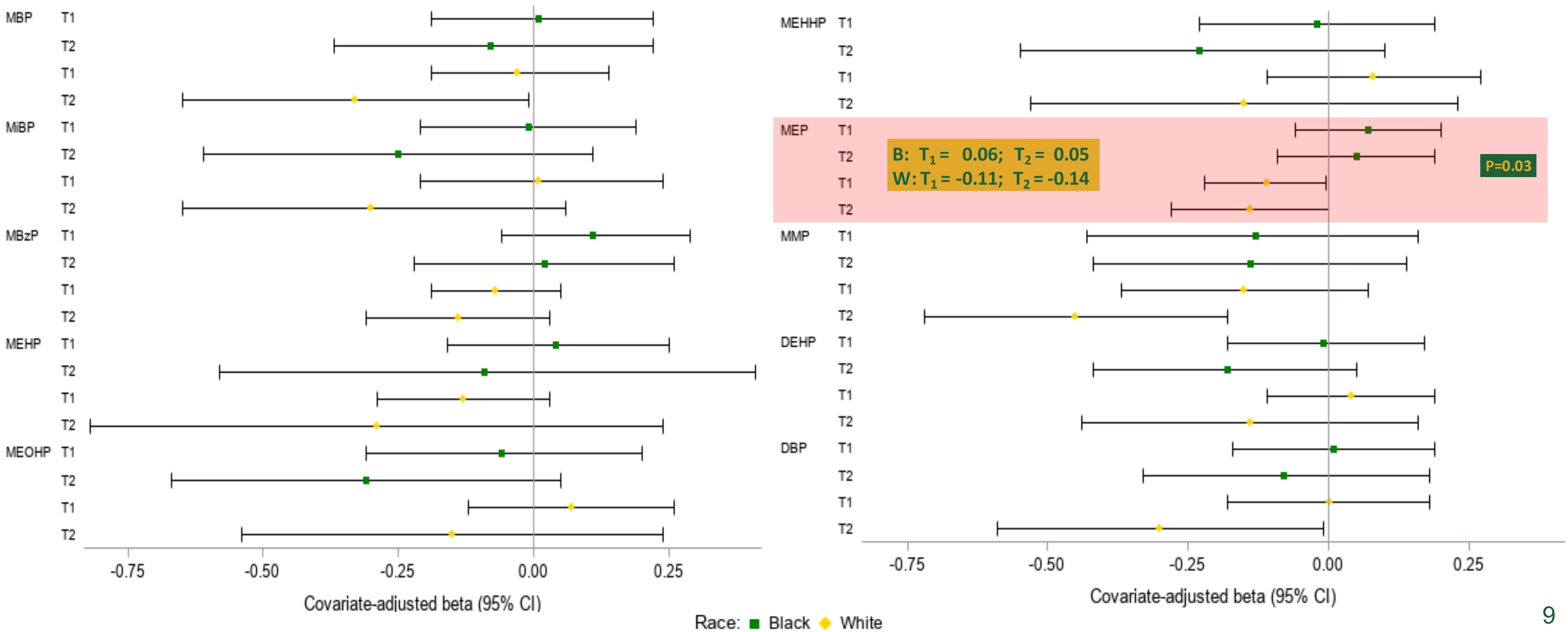
Greater 3rd trimester urinary MiBP & MMP were associated with lower birth weight



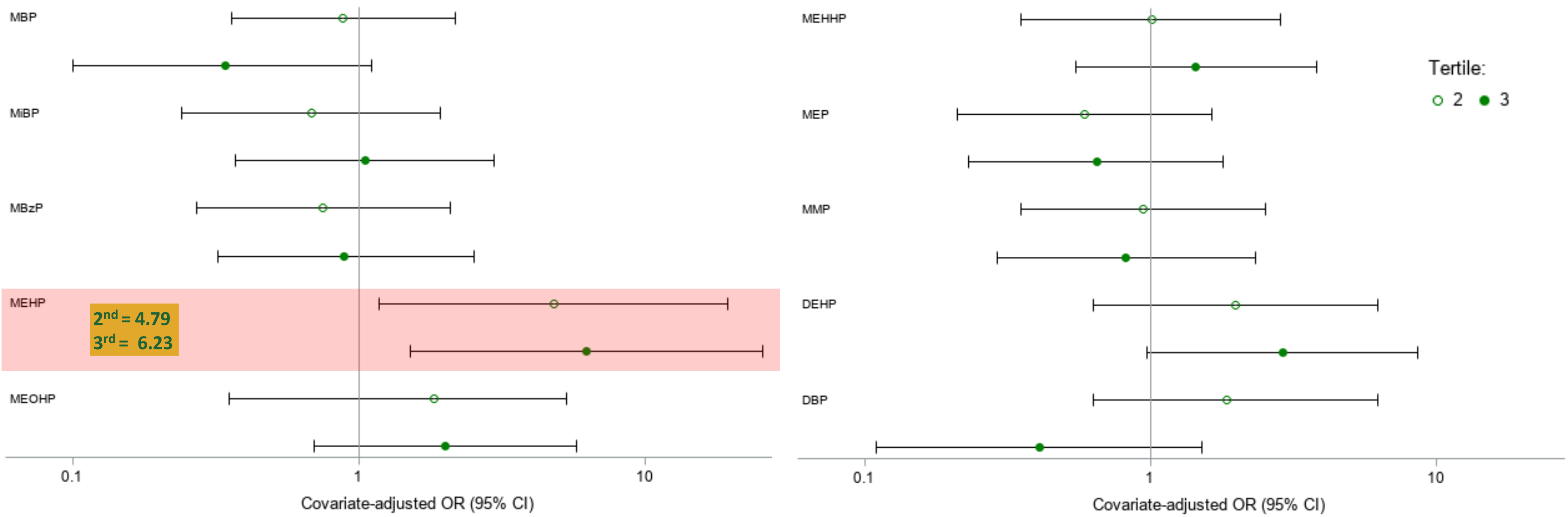
Bloom et al., 2019 Env. Int. 127:473-486

*Adjusted for maternal age, BMI, smoking, race & education

2nd trimester urinary MEP was associated with lower birth weight among white women



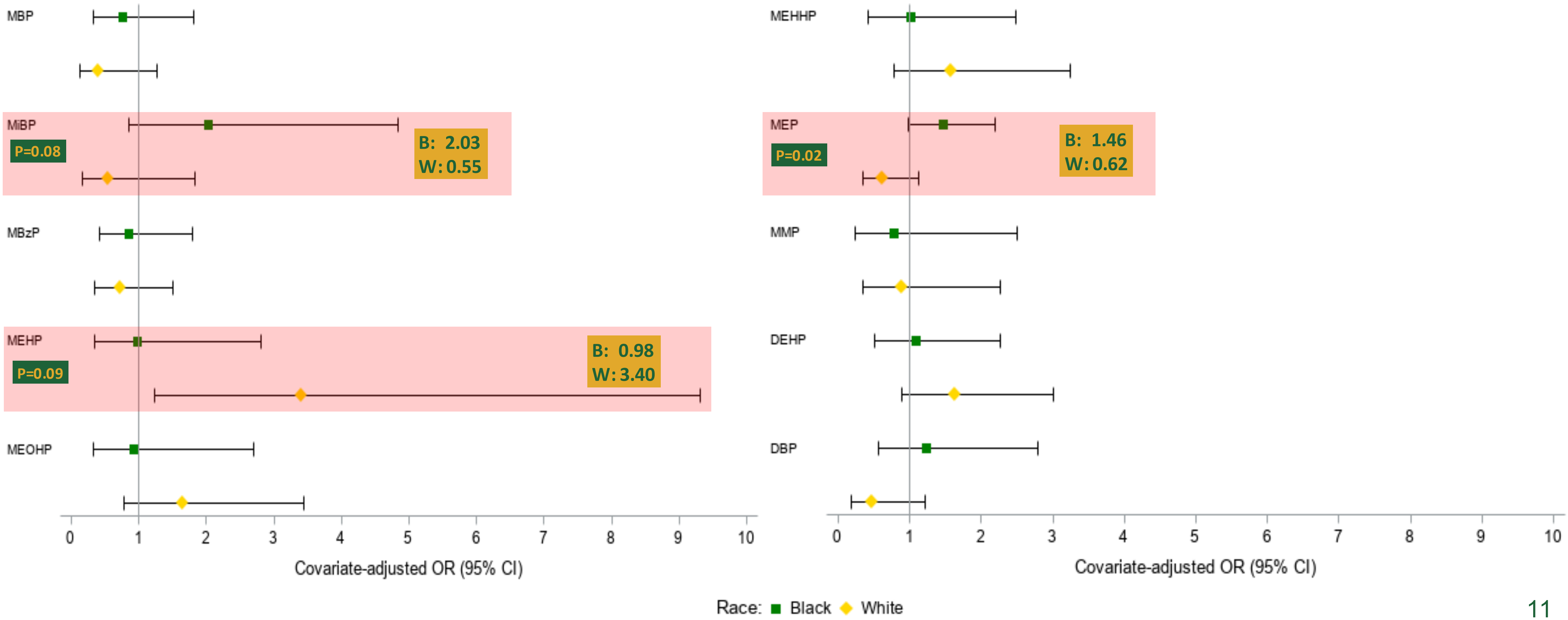
2nd trimester urinary MEHP was associated with higher risk for a preterm birth



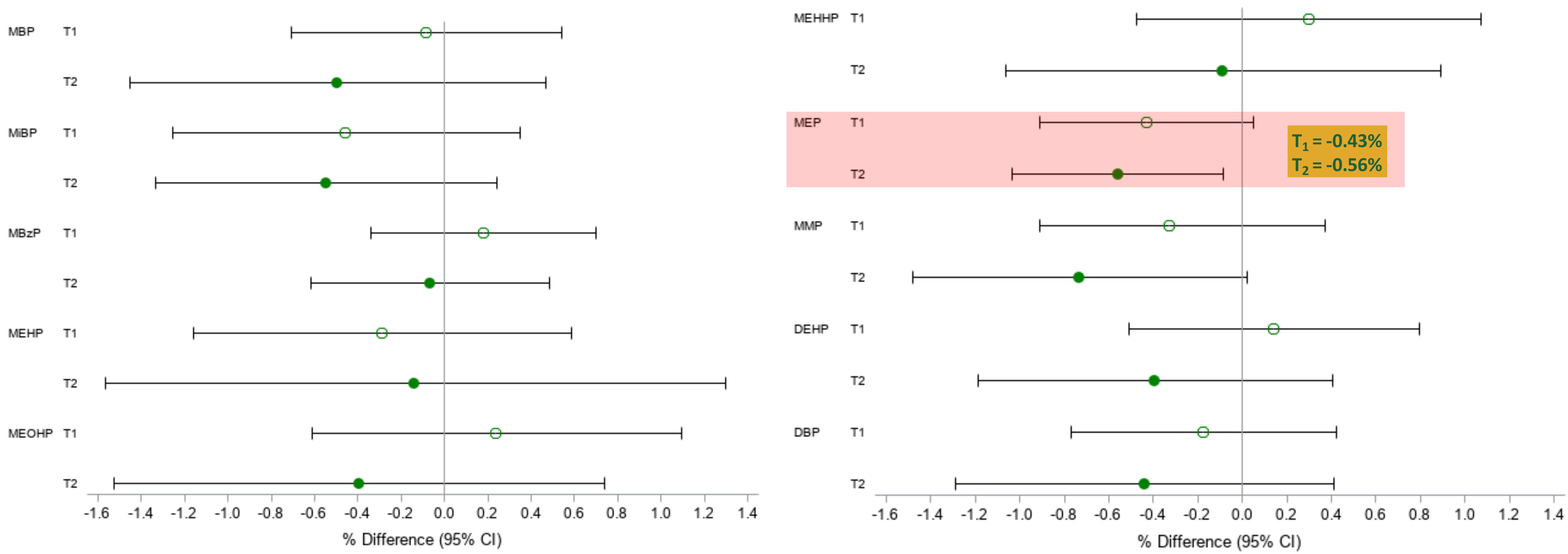
Bloom et al., 2019 Env. Int. 127:473-486

*Adjusted for maternal age, BMI, smoking, race, education & sex

2nd trimester MBP & MEP was associated with higher preterm birth risk in black & MEHP in white

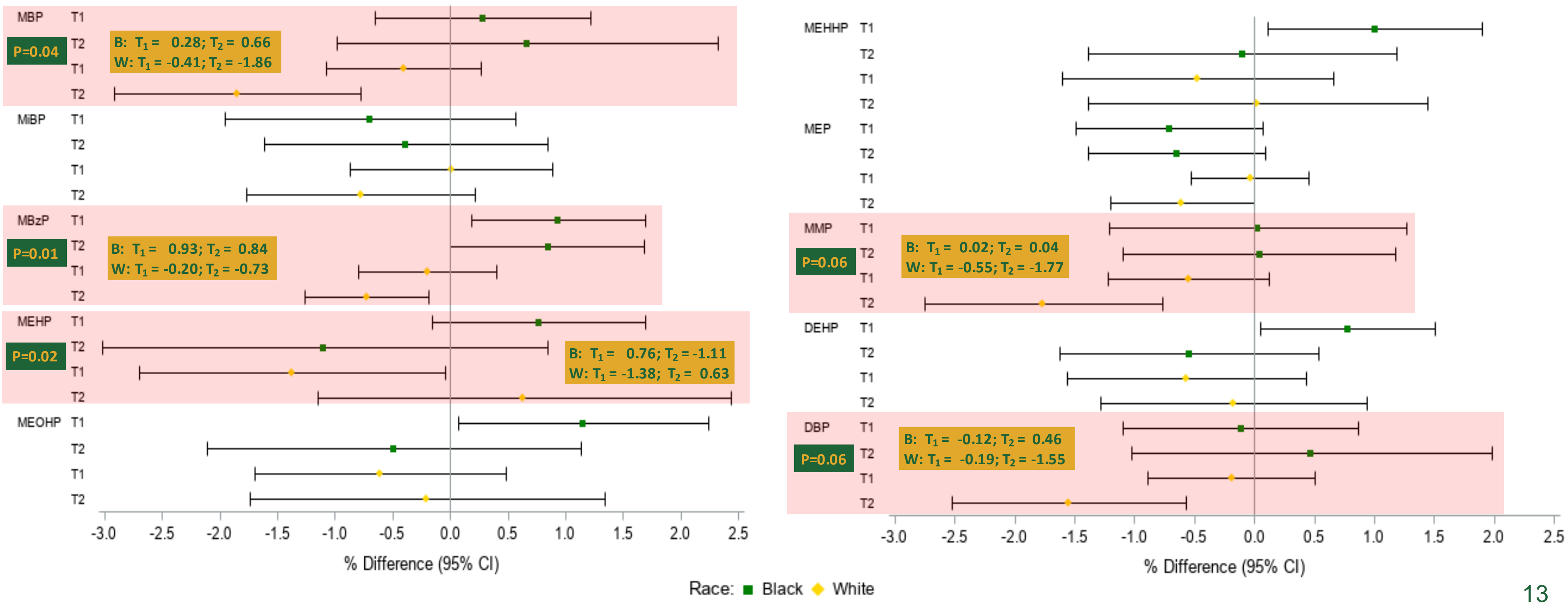


A doubling in 3rd trimester urinary MEP associated with smaller head circumference



*Adjusted for maternal age, BMI , smoking, race, education & sex

Associations of head circumference with MBP, MBzP, MEHP, MMP & ∑DBP limited to white



Conclusions & next steps

- Impacts of gestational phthalates on fetal development vary by race & by timing
  - Mode of action?
  - Targeted interventions/policies?
- Recent funding to incorporate environmental phenols & explore the impact of the mixtures
- Integrate objective measures of non-chemical stressors in other populations

Thank you for your time!

The most exciting phrase in science, the one that heralds new discoveries, is not 'eureka' but 'that's funny'…

- Isaac Asimov, PhD 1920-1992

https://forums.vrzone.com/chit-chatting/1748805-the-science-behind-our-amazing-twins-one-black-one-white.html, accessed 11/13/20