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Supplemental Material

Urinary Concentrations of Bisphenol A and Phthalate Metabolites Measured during Pregnancy and Risk of Preeclampsia

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Table S1. Specific gravity corrected urinary BPA and phthalate concentrations (ng/mL) geometric means (GM) and 95% Confidence Intervals (95% CI).

	Visit 1 (N=479)	Visit 2 (N=422)	Visit 3 (N=412)	Visit 4 (N=380)
	GM (95%CI)	GM (95%CI)	GM (95%CI)	GM (95%CI)
BPA				
Cases	1.56 [1.25, 1.94]	1.37 [1.10, 1.74]	1.39 [1.06, 1.81]	1.30 [0.97, 1.76]
Controls	1.32 [1.22, 1.43]	1.31 [1.21, 1.42]	1.38 [1.27, 1.51]	1.34 [1.23, 1.46]
MEHP				
Cases	12.0 [7.9, 18.2]	10.5 [6.9, 15.9]	10.4 [7.5, 14.4]	7.5 [4.9, 11.6]
Controls	12.8 [11.3, 14.5]	11.4 [10.1, 12.9]	9.8 [8.6, 11.0]	10.2 [8.9, 11.6]
MEHHP				
Cases	43.0 [29.4, 62.9]	34.4 [23.5, 50.2]	35.2 [24.1, 51.4]	32.9 [22.3, 48.3]
Controls	40.6 [35.9, 45.9]	34.1 [30.4, 38.2]	26.3 [23.2, 29.8]	35.0 [30.7, 39.8]
MEOHP				
Cases	21.8 [14.9, 31.9]	19.1 [13.1, 27.8]	21.4 [15.2, 30.1]	20.5 [14.4, 29.1]
Controls	19.9 [17.6, 22.5]	18.1 [16.2, 20.2]	15.2 [13.4, 17.3]	20.0 [17.6, 22.7]
MECPP				
Cases	68.0 [45.9, 100.7]	52.6 [36.0, 76.8]	61.1 [43.2, 86.4]*	60.5 [40.3, 91.1]
Controls	50.1 [44.5, 56.4]	42.0 [37.3, 47.2]	36.4 [32.0, 41.4]	47.8 [42.0, 54.4]
ΣDEHP^a				
Cases	0.53 [0.37, 0.78]	0.42 [0.30, 0.61]	0.46 [0.33, 0.64]	0.45 [0.31, 0.64]
Controls	0.45 [0.40, 0.50]	0.38 [0.34, 0.43]	0.32 [0.28, 0.36]	0.41 [0.36, 0.46]
MBzP				
Cases	6.7 [4.9, 9.1]	8.0 [5.6, 11.4]	7.4 [5.7, 9.5]	8.2 [5.9, 11.4]
Controls	7.0 [6.3, 7.8]	6.8 [6.1, 7.7]	6.8 [6.1, 7.7]	7.8 [7.0, 8.8]
MBP				
Cases	17.7 [14.1, 22.3]	19.5 [15.2, 25.0]	18.7 [15.6, 22.3]	21.3 [16.9, 26.9]
Controls	18.0 [16.4, 19.7]	18.1 [16.4, 20.0]	17.2 [15.4, 19.2]	19.8 [18.0, 21.6]
MiBP				
Cases	7.4 [5.8, 9.3]	6.9 [5.5, 8.6]	6.5 [5.5, 7.8]	8.7 [7.1, 10.6]
Controls	7.3 [6.7, 7.8]	7.2 [6.6, 7.9]	7.4 [6.8, 8.1]	9.1 [8.3, 9.9]
MEP				
Cases	193.3 [122.4, 305.1]	170.2 [105.9, 273.5]	173.5 [103.0, 292.4]	237.0 [128.8, 435.9]
Controls	135.7 [118.0, 156.0]	144.1 [122.7, 169.1]	136.5 [116.8, 159.5]	141.3 [119.4, 167.3]
MCCP				
Cases	2.4 [1.9, 3.1]	1.8 [1.4, 2.4]	2.4 [1.7, 3.2]	2.2 [1.6, 3.1]
Controls	2.3 [2.0, 2.5]	2.4 [2.1, 2.7]	1.9 [1.7, 2.1]	2.1 [1.9, 2.4]

*p-value < 0.05 between cases and controls Wilcoxon Rank Sum test

^a nmol/L

Table S2. Adjusted hazard ratios [95% confidence intervals] for onset of preeclampsia before 34 weeks of gestation in association with an interquartile range increase in BPA and phthalate metabolite concentrations (ng/mL)

	Average (Visit 1-3)	Visit 1	Visit 2	Visit 3
< 34 weeks				
N (cases, controls)	(8, 432)	(8, 431)	(8, 379)	(6, 368)
BPA	0.81 [0.19, 3.48]	2.63 [0.95, 7.29]	0.88 [0.15, 5.32]	0.25 [0.07, 0.88]*
MEHP	0.57 [0.22, 1.43]	0.74 [0.29, 1.85]	0.49 [0.17, 1.37]	0.61 [0.26, 1.43]
MEHHP	0.88 [0.31, 2.49]	0.93 [0.43, 2.02]	0.55 [0.17, 1.75]	1.29 [0.50, 3.29]
MEOHP	0.68 [0.24, 1.96]	0.84 [0.38, 1.83]	0.44 [0.14, 1.38]	1.06 [0.44, 2.59]
MECPP	1.02 [0.35, 2.95]	1.04 [0.40, 2.69]	0.65 [0.23, 1.85]	1.32 [0.51, 3.41]
∑DEHP	0.88 [0.31, 2.50]	0.97 [0.39, 2.39]	0.57 [0.18, 1.76]	1.16 [0.44, 3.04]
MBzP	0.61 [0.21, 1.83]	0.56 [0.20, 1.60]	0.78 [0.22, 2.75]	0.68 [0.21, 2.21]
MBP	0.35 [0.10, 1.25]	0.49 [0.20, 1.25]	0.48 [0.11, 2.03]	0.63 [0.24, 1.63]
MiBP	0.50 [0.24, 1.04]	0.57 [0.23, 1.40]	0.39 [0.14, 1.10]	0.63 [0.27, 1.46]
MEP	0.62 [0.22, 1.70]	0.59 [0.24, 1.48]	0.88 [0.29, 2.71]	0.62 [0.22, 1.73]
MCPP	0.80 [0.29, 2.20]	0.93 [0.43, 2.00]	0.70 [0.24, 2.00]	1.29 [0.49, 3.38]
≥ 34 and < 37 weeks				
N (cases, controls)	(23, 432)	(23, 429)	(19, 379)	(21, 368)
BPA	2.06 [1.03, 4.13]*	1.64 [0.86, 3.14]	1.97 [0.69, 5.61]	1.40 [0.74, 2.65]
MEHP	0.97 [0.55, 1.72]	0.91 [0.53, 1.56]	0.98 [0.52, 1.83]	1.16 [0.70, 1.91]
MEHHP	1.18 [0.63, 2.20]	1.03 [0.61, 1.76]	1.09 [0.55, 2.13]	1.44 [0.83, 2.49]
MEOHP	1.36 [0.72, 2.59]	1.11 [0.63, 1.96]	1.23 [0.64, 2.34]	1.51 [0.88, 2.60]
MECPP	1.96 [1.09, 3.52]*	1.65 [0.93, 2.93]	1.60 [0.90, 2.85]	1.78 [1.05, 3.02]*
∑DEHP	1.53 [0.85, 2.76]	1.29 [0.74, 2.24]	1.38 [0.74, 2.57]	1.59 [0.93, 2.69]
MBzP	1.18 [0.65, 2.15]	1.31 [0.69, 2.46]	1.31 [0.63, 2.73]	1.27 [0.65, 2.46]
MBP	1.18 [0.67, 2.06]	1.36 [0.79, 2.34]	1.34 [0.69, 2.63]	1.14 [0.61, 2.14]
MiBP	0.78 [0.42, 1.47]	1.32 [0.65, 2.66]	0.93 [0.38, 2.26]	0.66 [0.38, 1.16]
MEP	1.47 [0.82, 2.65]	1.61 [0.93, 2.79]	1.23 [0.61, 2.47]	1.74 [0.91, 3.32]
MCPP	0.97 [0.54, 1.75]	1.18 [0.75, 1.83]	0.77 [0.39, 1.51]	1.24 [0.70, 2.20]
≥ 37 weeks				
N (cases, controls)	(19, 432)	(19, 431)	(16, 379)	(17, 368)
BPA	0.78 [0.44, 1.41]	1.17 [0.70, 1.96]	0.59 [0.26, 1.31]	0.74 [0.43, 1.28]
MEHP	1.35 [0.94, 1.96]	1.25 [0.91, 1.73]	1.12 [0.75, 1.67]	1.17 [0.82, 1.67]
MEHHP	1.33 [0.87, 2.03]	1.32 [0.96, 1.80]	0.93 [0.59, 1.47]	1.22 [0.81, 1.82]
MEOHP	1.83 [1.19, 2.80]*	1.50 [1.07, 2.09]*	1.14 [0.74, 1.76]	1.56 [1.06, 2.30]*
MECPP	2.35 [1.59, 3.48]*	1.83 [1.28, 2.63]*	1.31 [0.88, 1.95]	2.00 [1.37, 2.91]*
∑DEHP	1.86 [1.25, 2.74]*	1.55 [1.11, 2.16]*	1.13 [0.73, 1.72]	1.63 [1.12, 2.38]*
MBzP	1.03 [0.68, 1.57]	0.85 [0.57, 1.29]	1.15 [0.70, 1.90]	1.19 [0.75, 1.88]
MBP	1.31 [0.90, 1.91]	1.11 [0.74, 1.68]	1.10 [0.64, 1.89]	1.66 [1.13, 2.45]*

MiBP	1.20 [0.76, 1.88]	1.19 [0.76, 1.86]	1.07 [0.60, 1.93]	1.19 [0.72, 1.97]
MEP	1.49 [1.00, 2.23]*	1.78 [1.26, 2.53]*	1.24 [0.78, 1.96]	1.15 [0.71, 1.85]
MCP	0.99 [0.68, 1.46]	1.15 [0.88, 1.51]	0.56 [0.34, 0.92]*	1.39 [0.94, 2.08]

Models adjusted for specific gravity.

* statistically significant ($p < 0.05$)

Table S3. Adjusted hazard ratios [95% confidence intervals] for onset of preeclampsia in association with an interquartile range increase in BPA and phthalate metabolite concentrations (ng/mL) after removing cases of superimposed preeclampsia.

Analyte	Average (Visit 1-3) (34, 406)	Visit 1 (34, 405)	Visit 2 (28, 366)	Visit 3 (30, 359)	Visit 4 ^a (24, 341)
BPA	0.83 [0.48, 1.43]	1.23 [0.77, 1.96]	0.94 [0.45, 1.94]	0.58 [0.33, 1.00]	1.30 [0.60, 2.81]
MEHP	1.64 [1.17, 2.30]*	1.36 [1.02, 1.81]*	1.22 [0.84, 1.78]	1.73 [1.24, 2.42]*	2.54 [1.59, 4.06]*
MEHHP	1.22 [0.83, 1.81]	1.18 [0.88, 1.58]	0.85 [0.55, 1.30]	1.43 [0.97, 2.11]	3.38 [1.81, 6.29]*
MEOHP	1.68 [1.13, 2.49]*	1.35 [0.98, 1.85]	1.13 [0.75, 1.70]	1.85 [1.27, 2.70]*	3.92 [2.00, 7.68]*
MECPP	2.46 [1.68, 3.59]*	1.86 [1.32, 2.62]*	1.52 [1.05, 2.21]*	2.42 [1.66, 3.51]*	3.29 [1.73, 6.24]*
ΣDEHP	1.84 [1.28, 2.65]*	1.48 [1.08, 2.03]*	1.25 [0.84, 1.85]	2.02 [1.40, 2.91]*	3.66 [1.92, 6.98]*
MBzP	0.91 [0.59, 1.40]	0.86 [0.57, 1.28]	0.98 [0.58, 1.65]	1.08 [0.64, 1.79]	2.95 [1.15, 7.61]*
MBP	1.23 [0.83, 1.82]	1.19 [0.82, 1.72]	0.99 [0.56, 1.76]	1.49 [0.98, 2.25]	2.28 [1.07, 4.89]*
MiBP	0.83 [0.55, 1.26]	1.17 [0.78, 1.76]	0.80 [0.45, 1.44]	0.65 [0.43, 0.96]*	1.88 [0.56, 6.33]
MEP	1.66 [1.15, 2.40]*	2.16 [1.55, 3.02]*	1.21 [0.80, 1.84]	1.39 [0.90, 2.14]	0.76 [0.45, 1.29]
MCCP	0.95 [0.67, 1.33]	1.09 [0.85, 1.40]	0.62 [0.39, 1.00]	1.53 [1.01, 2.29]*	3.22 [1.83, 5.65]*

Models adjusted for specific gravity, maternal age, race, BMI, smoking during pregnancy, and infant sex

^a If exposure measure occurred after preeclampsia diagnosis participants were removed from analysis (N=6)

* statistically significant (p<0.05)