Supplemental Material. Urinary polycyclic aromatic hydrocarbons among children with chronic kidney disease: A case of reverse causation?

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Supplemental Table 1. Distributions of urinary metabolites of OH-PAHs in National Health and Nutrition Examination Survey samples from subjects aged 6-19 years, 2011-12

				Percentile			
Analyte	LOD (ng/ml)	%<LOD	GM	25th	50th	75th	95th
1-Hydroxynapthalene (1-NAP) (ng/ml)	0.044	0.2	1.07	0.44	1.00	2.17	11.55
2-Hydroxynapthalene (2-NAP) (ng/ml)	0.042	0.0	3.78	1.71	3.82	8.10	25.18
∑NAP (nmol/L)			37.12	17.43	37.99	75.09	235.25
1-Hydroxyphenanthrene (1-PHEN) (ng/ml)	0.01	0.1	0.11	0.06	0.12	0.21	0.44
2-Hydroxyphenanthrene (2-PHEN) (ng/ml)	0.01	4.2	0.05	0.02	0.05	0.09	0.20
3-Hydroxyphenanthrene (3-PHEN) (ng/ml)	0.01	2.9	0.06	0.03	0.06	0.12	0.29
4-Hydroxyphenanthrene (4-PHEN) (ng/ml)	0.01	22.2	0.02	0.01	0.02	0.03	0.08
2-Hydroxyfluorene (2-FLUO) (ng/ml)	0.01	0.0	0.20	0.10	0.19	0.38	1.07
3-Hydroxyfluorene (3-FLUO) (ng/ml)	0.01	1.0	0.08	0.04	0.08	0.15	0.50
9-Hydroxyfluorene (9-FLUO) (ng/ml)	0.01	0.2	0.18	0.09	0.18	0.38	1.00
∑2/3/9-FLUO (ng/ml)			0.49	0.24	0.49	0.94	2.40

∑NAP is the molar sum of 1-NAP and 2-NAP

∑2/3/9-FLUO is the sum of 2-FLUO, 3-FLUO, and 9-FLUO and is on the volume basis (ng/ml) in order to correspond to the measure in CKiD.

Supplemental Table 2. Associations between summed PAH metabolites and eGFR by initial eGFR status

	eGFR ≤ 45 (N = 769)			eGFR > 45 (N = 1249)		
	β	95% CI	p	β	95% CI	p
ln-∑NAP	0.095	-0.441, 0.631	0.73	0.511	-0.158, 1.180	0.13
ln-∑PHEN	1.482	0.814, 2.150	<0.01	1.048	0.385, 1.711	<0.01
ln-∑PAH	0.121	-0.417, 0.659	0.66	0.481	-0.174, 1.136	0.15

Supplemental Table 3. Associations between summed PAH metabolites and NGAL by initial eGFR status.

	eGFR ≤ 45 (N = 713)			eGFR > 45 (N = 1203)		
	β	95% CI	p	β	95% CI	p
ln-∑NAP	0.047	-0.100, 0.194	0.529	0.168	0.050, 0.286	0.005
ln-∑PHEN	-0.160	-0.341, 0.021	0.082	-0.028	-0.146, 0.090	0.643
ln-∑PAH	0.045	-0.102, 0.192	0.551	-0.155	0.039, 0.271	0.008

Supplemental Table 4. Associations between summed PAH metabolites and KIM-1 by initial eGFR status.

	eGFR ≤ 45 (N = 713)			eGFR > 45 (N = 1203)		
	β	95% CI	p	β	95% CI	p
ln-∑NAP	0.134*	-0.055, 0.323	0.167	0.435*	0.292, 0.578	<0.0001
ln-∑PHEN	0.216*	0.010, 0.422	0.041	0.342*	0.191, 0.493	<0.0001
ln-∑PAH	0.141*	-0.050, 0.332	0.147	0.436*	0.293, 0.579	<0.0001

*Asterisk denotes exposure has significant interaction with time and effect of exposure at baseline is presented.

Supplemental Table 5. Associations between summed PAH metabolites and 8-OHdG by initial eGFR status

	eGFR ≤ 45 (N = 768)			eGFR > 45 (N=1251)		
	β	95% CI	p	β	95% CI	p
ln-∑NAP	0.254*	0.150, 0.358	<0.0001	0.233*	0.156, 0.310	<0.0001
ln-∑PHEN	0.198	0.129, 0.267	<0.0001	0.272	0.225, 0.319	<0.0001
ln-∑PAH	0.255*	0.151, 0.359	<0.0001	0.232*	0.155, 0.309	<0.0001

*Asterisk denotes exposure has significant interaction with time and effect of exposure at baseline is presented.

Supplemental Table 6. Associations between ln-transformed chemical exposures and clinical renal function outcomes adjusting for urinary creatinine using covariate-adjusted standardization

	eGFR[a] (N=2024)			Log-UPCR[a] (N=1969)			SBP Z-score[b] (N=2035)			DBP Z-score[b] (N=2034)		
	β	95% CI	p	β	95% CI	p	β	95% CI	p	β	95% CI	p
ΣNAP	0.567	0.053, 1.081	0.030	-0.049	-0.096, -0.002	0.041	-0.024	-0.077, 0.029	0.374	-0.018	-0.067, 0.031	0.474
ΣPHEN	1.263*	0.451, 2.075	0.002	-0.138	-0.187, -0.089	<0.0001	-0.036	-0.089, 0.017	0.183	-0.037	-0.086, 0.012	0.139

[a] The model controlled for age, gender, race/ethnicity, glomerular status, birth weight, low birth weight, premature, ARB, AECI, BMI-Z score, SBP Z-score (all measured at each patient's first visit) and creatinine.

[b] The model controlled for age, gender, race/ethnicity, glomerular status, birth weight, low birth weight, premature, ARB, AECI, BMI-Z score (all measured at each patient's first visit) and creatinine

*Asterisk denotes exposure has significant interaction with time and effect of exposure at baseline is presented.

β: estimated effect per SD change

Supplemental Table 7. Associations between ln-transformed chemical exposures and ln-transformed kidney injury and oxidative stress biomarkers adjusting for urinary creatinine using covariate-adjusted standardization

	log-8-OHdG (N=2029)			log-F_2-isoprostane (N=1045)			log-NGAL (N=1925)			log-KIM-1 (N=1925)		
	β	95% CI	p	β	95% CI	p	β	95% CI	p	β	95% CI	p
ΣNAP	0.287*	0.222, 0.352	<0.0001	0.049	-0.067, 0.165	0.407	0.070	-0.030, 0.170	0.17	0.409*	0.291, 0.527	<0.0001
ΣPHEN	0.318*	0.255, 0.381	<0.0001	0.103	-0.013, 0.219	0.082	-0.169	-0.269, -0.069	0.001	0.313*	0.195, 0.431	<0.0001

All models controlled for age, gender, race/ethnicity, glomerular status, birth weight, low birth weight, premature, ARB, AECI, BMI-Z score, SBP Z-score (all measured at each patient's first visit) and creatinine

*Asterisk denotes exposure has significant interaction with time and effect of exposure at baseline is presented.

β: estimated effect per SD change

Supplemental Table 8. Associations between ln-transformed cumulative average chemical exposures and clinical renal function outcomes

	eGFR[a] (N=2024)			Log-UPCR[a] (N=1969)			SBP Z-score[b] (N=2035)			DBP Z-score[b] (N=2034)		
	β	95% CI	p	β	95% CI	p	β	95% CI	p	β	95% CI	p
ΣNAP	1.528	0.430, 2.626	0.006	-0.120*	-0.218, -0.022	0.017	-0.005	-0.083, 0.073	0.897	-0.029	-0.100, 0.042	0.417
ΣPHEN	4.576*	3.525, 5.627	<0.001	-0.314*	-0.402, -0.226	<0.001	-0.055	-0.124, 0.014	0.114	-0.053	-0.114, 0.008	0.088

[a] The model controlled for age, gender, race/ethnicity, glomerular status, birth weight, low birth weight, premature, ARB, AECI, BMI-Z score, SBP Z-score (all measured at each patient's first visit) and creatinine.

[b] The model controlled for age, gender, race/ethnicity, glomerular status, birth weight, low birth weight, premature, ARB, AECI, BMI-Z score (all measured at each patient's first visit) and creatinine

*Asterisk denotes exposure has significant interaction with time and effect of exposure at baseline is presented.

β: estimated effect per SD change

Supplemental Table 9. Associations between ln-transformed cumulative average chemical exposures and ln-transformed kidney injury and oxidative stress biomarkers

	log-8-OHdG (N=2029)			log-F_2-isoprostane (N=1045)			log-NGAL (N=1925)			log-KIM-1 (N=1925)		
	β	95% CI	p	β	95% CI	p	β	95% CI	p	β	95% CI	p
ΣNAP	0.26	0.209, 0.311	<0.0001	0.013	-0.124, 0.150	0.853	-0.021	-0.176, 0.134	0.787	0.271*	0.142, 0.400	<0.0001
ΣPHEN	0.31	0.269, 0.351	<0.0001	-0.014	-0.134, 0.106	0.817	-0.401	-0.534, -0.268	<0.0001	0.148*	0.032, 0.264	0.013

All models controlled for age, gender, race/ethnicity, glomerular status, birth weight, low birth weight, premature, ARB, AECI, BMI-Z score, SBP Z-score, and Cr

*Asterisk denotes exposure has significant interaction with time and effect of exposure at baseline is presented.

β: estimated effect per SD change