Electronic Supplementary Material (ESI) for Environmental Science: Processes & Impacts.

Supplemental material

Association of exposure to polycyclic aromatic hydrocarbons with thyroid hormones in adolescents and adults, and the influence of iodine status

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Table S1. Basic demographic characteristics of participants by iodine status.

	Adequate and above-requirements	Insufficient	Excessive	P-value
	N (%)	N (%)	N (%)	
Number of Participants	1642 (49.18)	1069 (32.01)	628 (18.81)	
Age (years, Mean ± SD)	42.75 ± 0.52	40.57 ± 0.57	43.03 ± 0.86	0.011
BMI category				0.002
Thinness	23 (1.40)	24 (2.25)	8 (1.27)	
Normal	538 (32.76)	412 (38.54)	196 (31.21)	
Overweight	501 (30.51)	317 (29.65)	192 (30.57)	
Obesity	580 (35.32)	316 (29.56)	232 (36.94)	
Smoking status				0.090
Yes	365 (22.23)	253 (23.67)	120 (19.11)	
No	1277 (77.77)	816 (76.33)	508 (80.89)	
Race				0.008
Mexican American	272 (16.57)	142 (13.28)	102 (16.24)	
Other Hispanic	200 (12.18)	115 (10.76)	63 (10.03)	
Non-Hispanic White	620 (37.76)	376 (35.17)	248 (39.49)	
Non-Hispanic Black	378 (23.02)	290 (27.13)	140 (22.29)	
Other Race	172 (10.48)	146 (13.66)	75 (11.94)	
PIR				0.021
<1	325 (19.79)	252 (23.57)	152 (24.20)	
1~	430 (26.19)	241 (22.54)	163 (25.96)	
≥2	887 (54.02)	576 (53.88)	313 (49.84)	

Table S2. Detection rate of OH-PAHs.

	Total(n=3339)	Adolescents (n=648)	Adults (n=2691)
	%>LOD	%>LOD	%>LOD
1-NAP	99.94	100	99.93
2-NAP	100	100	100
3-FLU	99.07	99.38	99.00
2-FLU	100	100	100
3-PHE	98.41	99.07	98.25
1-PHE	99.97	100	99.96
2-PHE	99.01	98.92	99.03
1-PYR	99.19	99.38	99.15
9-FLU	100	100	100

LOD, limit of detection; 1-NAP, 1-hydroxynaphthalene; 2-NAP, 2-hydroxynaphthalene; 3-FLU, 3-hydroxyfluorene; 2-FLU, 2-hydroxyfluorene; 3-PHE, 3-hydroxyphenanthrene; 1-PHE, 1-hydroxyphenanthrene; 2-PHE, 2-hydroxyphenanthrene; 1-PYR, 1-hydroxypyrene; 9-FLU, 9-hydroxyfluorene.

Table S3. Median and interquartile range (IQR) of OH-PAHs by sex and smoking status.

	Adolescents (n=648)		P-value	Adults (n=2691)		P-value	Adolescents (n=648)		P-value	Adults (n=2691)		P-value
	Male	Female		Male	Female		Non-smoker	Smoker		Non-smoker	Smoker	
1-NAP (pg/mL)	1411 (666, 3216)	1191 (554, 2818)	0.376	2190 (917, 7162)	1636 (655, 6075)	<0.001	1089 (546, 2289)	9120 (2927, 14677)	<0.001	1314 (632, 3029)	9627 (4822, 17931)	<0.001
2-NAP (pg/mL)	4402 (2501, 9133)	5194 (2472, 13296)	0.029	4830 (2208, 10280)	4332 (1952, 10657)	0.141	4202 (2171, 9027)	12426 (6060, 20757)	<0.001	3461 (1674, 6620)	12035 (6568, 21063)	<0.001
3-FLU (pg/mL)	100 (56, 214)	90 (48, 183)	0.066	110 (50, 319)	71 (36, 189)	<0.001	84 (46, 157)	517 (240, 958)	<0.001	63 (35, 118)	628 (282, 1167)	<0.001
2-FLU (pg/mL)	263 (145, 502)	257 (126, 476)	0.323	300 (149, 735)	205 (110, 493)	<0.001	231 (123, 420)	925 (462, 1736)	<0.001	189 (106, 334)	1175 (552, 2150)	<0.001

3-PHE (pg/mL)	92 (49, 178)	87 (45, 149)	0.179	93 (49, 185)	65 (34, 133)	<0.001	82 (43, 143)	170 (96, 285)	<0.001	64 (34, 115)	174 (92, 297)	<0.001
1-PHE (pg/mL)	128 (68, 219)	134 (72, 218)	0.434	139 (79, 267)	123 (65, 221)	<0.001	121 (68, 207)	201 (113, 301)	<0.001	115 (65, 211)	202 (110, 352)	<0.001
2-PHE (pg/mL)	60 (36, 112)	61 (34, 101)	0.462	76 (44, 141)	54 (30, 104)	<0.001	55 (33, 97)	106 (61, 159)	<0.001	56 (32, 100)	118 (68, 203)	<0.001
1-PYR (pg/mL)	129 (73, 257)	165 (93, 301)	0.012	115 (57, 231)	98 (50, 203)	<0.001	133 (74, 246)	285 (160, 495)	<0.001	86 (45, 163)	223 (124, 442)	<0.001
9-FLU (pg/mL)	276 (134, 545)	246 (128, 470)	0.107	366 (179, 747)	248 (125, 519)	<0.001	239 (123, 463)	555 (308, 916)	<0.001	240 (126, 455)	757 (354, 1226)	<0.001

1-NAP, 1-hydroxynaphthalene; 2-NAP, 2-hydroxynaphthalene; 3-FLU, 3-hydroxyfluorene; 2-FLU, 2-hydroxyfluorene; 3-PHE, 3-hydroxyphenanthrene; 1-PHE, 1-hydroxyphenanthrene; 2-PHE, 2-hydroxyphenanthrene; 1-PYR, 1-hydroxypyrene; 9-FLU, 9-hydroxyfluorene.

Table S4. Median and interquartile range (IQR) of THs by iodine status.

	Adequate and above-requirements (n=1642)	Insufficient (n=1069)	Excessive (n=628)	P-value
FT3 (pg/mL)	3.22 (2.98, 3.50)	3.20 (2.99, 3.48)	3.20 (2.99, 3.50)	0.434
FT4 (ng/dL)	0.80 (0.70, 0.90)	0.80 (0.71, 0.90)	0.80 (0.70, 0.90)	0.024
TT3 (ng/dL)	115 (101, 130)	114 (102, 131)	114 (101, 131)	0.917
TT4 (ug/dL)	7.70 (6.80, 8.70)	7.70 (6.89, 8.60)	7.70 (6.78, 8.71)	0.976
TSH (mIU/L)	1.48 (1.04, 2.23)	1.48 (1.04, 2.08)	1.65 (1.11, 2.29)	0.001
Tg (ng/mL)	9.90 (5.73, 16.5)	11.04 (6.67, 18.31)	9.21 (5.39, 15.94)	<0.001
G_D	28.76 (23.85, 33.09)	28.76 (24.04, 32.76)	29.87 (23.85, 34.19)	0.449
G_T	1.09 (0.97, 1.23)	1.09 (0.98, 1.22)	1.09 (0.96, 1.24)	0.973

FT3, free triiodothyronine; FT4, free thyroxine; TT3, total triiodothyronine; TT4, total thyroxine, TSH, thyroid-stimulating hormone; Tg, thyroglobulin. G_D, sum activity of peripheral deiodinases as SPINA-GD; G_T, thyroid's secretory capacity as SPINA-GT.

Table S5. Spearman correlation coefficients between OH-PAHs.

	1-NAP	2-NAP	3-FLU	2-FLU	3-PHE	1-PHE	2-PHE	1-PYR	9-FLU
1-NAP	1								
2-NAP	0.5569*	1							
3-FLU	0.6769*	0.6784*	1						
2-FLU	0.6670*	0.7034*	0.9539*	1					
3-PHE	0.6235*	0.6143*	0.8519*	0.8656*	1				
1-PHE	0.5516*	0.5766*	0.7259*	0.7764*	0.8670*	1			
2-PHE	0.5615*	0.6292*	0.7798*	0.8424*	0.9087*	0.8861*	1		
1-PYR	0.5160*	0.6203*	0.7713*	0.7844*	0.8181*	0.8050*	0.8029*	1	
9-FLU	0.6138*	0.6084*	0.7501*	0.8023*	0.8527*	0.8249*	0.8508*	0.7158*	1

* $p < 0.001$.

1-NAP, 1-hydroxynaphthalene; 2-NAP, 2-hydroxynaphthalene; 3-FLU, 3-hydroxyfluorene; 2-FLU, 2-hydroxyfluorene; 3-PHE, 3-hydroxyphenanthrene; 1-PHE, 1-hydroxyphenanthrene; 2-PHE, 2-hydroxyphenanthrene; 1-PYR, 1-hydroxypyrene; 9-FLU, 9-hydroxyfluorene.

Table S6. Associations between OH-PAHs quartiles and thyroid measurements in adolescents[1].

OH-PAHs	Quartile[2]	FT3	FT4	TT3	TT4	TSH	Tg	G_D	G_T
1-NAP	Q1 <5.41	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 5.41~	-1.00	2.22	-1.19	0.30	-5.64	9.09	-3.63	0.30
		(-4.11, 2.22)	(-1.98, 6.61)	(-5.64, 3.36)	(-4.40, 5.34)	(-15.80, 5.76)	(-17.22, 43.91)	(-10.06, 3.25)	(-4.40, 5.34)
	Q3 9.69~	-1.59	1.01	-2.18	0.50	6.18	9.42	-5.26	0.50
		(-5.16, 2.22)	(-3.15, 5.23)	(-6.57, 2.43)	(-5.26, 6.61)	(-8.24, 23.00)	(-21.73, 52.96)	(-11.31, 1.11)	(-5.26, 6.61)
	Q4 23.49~	-2.86	4.81	-2.66	5.97*	-5.92	17.35	-6.85*	5.97*
		(-5.82, 0.10)	(0.00, 9.97)	(-7.23, 2.12)	(0.20, 12.08)	(-24.72, 17.70)	(-26.29, 86.64)	(-12.54, -0.90)	(0.10, 12.08)

2-NAP	Q1 <20.48	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 20.48~	0.80	2.53	2.43	5.23	-8.42	21.17	0.30	5.23
		(-2.27, 3.98)	(-1.69, 6.93)	(-3.15, 8.33)	(-0.40, 11.29)	(-24.57, 11.29)	(-11.40, 65.70)	(-7.13, 8.44)	(-0.40, 11.29)
	Q3 38.77~	2.94	2.84	5.44	2.63	-12.72	15.37	2.94	2.63
		(-1.98, 8.11)	(-1.69, 7.47)	(-1.98, 13.54)	(-2.86, 8.44)	(-26.66, 3.87)	(-20.07, 66.36)	(-6.67, 13.43)	(-2.86, 8.55)
	Q4 71.80~	1.11	0.10	1.41	2.12	-23.51*	9.75	3.56	2.22
		(-3.92, 6.29)	(-4.59, 4.92)	(-5.64, 8.87)	(-3.92, 8.44)	(-39.59, -3.15)	(-30.23, 72.46)	(-6.39, 14.45)	(-3.82, 8.65)
3-FLU	Q1 <0.47	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 0.47~	3.36*	2.84	5.76	2.33	-6.95	2.53	3.56	2.33
		(0.60, 6.18)	(-1.00, 6.82)	(-0.40, 12.30)	(-3.05, 8.00)	(-17.72, 5.23)	(-17.30, 27.12)	(-4.02, 11.85)	(-3.05, 8.00)
	Q3 0.75~	4.29*	0.30	5.55*	-2.76	-10.24	-7.96	7.14*	-2.76
		(1.11, 7.57)	(-3.92, 4.71)	(0.40, 10.85)	(-6.95, 1.51)	(-26.73, 9.97)	(-25.10, 13.09)	(1.01, 13.77)	(-6.95, 1.51)
	Q4 1.32~	3.67	0.00	3.25	-4.21	-12.63	16.88	6.08	-4.21
		(-0.10, 7.68)	(-4.88, 5.02)	(-1.98, 8.76)	(-9.79, 1.61)	(-32.23, 12.64)	(-18.86, 68.20)	(-0.20, 12.86)	(-9.70, 1.71)
2-FLU	Q1 <1.27	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 1.27~	1.61	-0.60	8.00*	3.15	-12.80	25.61*	5.76	3.25
		(-0.80, 3.98)	(-3.63, 2.53)	(4.39, 11.85)	(-2.37, 9.09)	(-24.50, 0.70)	(1.92, 54.81)	(-0.50, 12.41)	(-2.37, 9.20)
	Q3 1.96~	2.94	-0.30	8.00*	-1.29	-15.30	0.80	6.50	-1.19
		(-0.50, 6.50)	(-3.92, 3.46)	(2.94, 13.31)	(-4.97, 2.63)	(-28.68, 0.70)	(-18.70, 24.98)	(-0.80, 14.45)	(-4.88, 2.63)
	Q4 3.14~	1.41	-1.88	3.15	-0.80	-22.82	33.51	2.43	-0.70
		(-2.57, 5.44)	(-8.24, 4.92)	(-2.76, 9.42)	(-8.42, 7.47)	(-43.73, 5.76)	(-5.07, 87.95)	(-5.82, 11.40)	(-8.33, 7.57)
3-PHE	Q1 <0.43	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 0.43~	1.41	-0.20	5.13*	4.60	-7.04	24.98	-0.10	4.50

		(-1.69, 4.71)	(-3.63, 3.36)	(0.70, 9.75)	(-0.80, 10.19)	(-19.91, 8.00)	(-5.82, 65.86)	(-7.04, 7.36)	(-0.80, 10.19)
	Q3 0.66~	3.05	-2.08	5.87*	-2.47	-5.35	-12.72	7.04	-2.47
		(-0.10, 6.29)	(-6.01, 2.02)	(0.30, 11.63)	(-7.96, 3.25)	(-19.35, 11.18)	(-35.98, 19.01)	(-0.80, 15.60)	(-7.96, 3.25)
	Q4 1.05~	0.30	-2.37	1.01	-1.69	-5.82	15.49	2.94	-1.69
		(-2.96, 3.67)	(-7.32, 2.84)	(-4.21, 6.50)	(-6.85, 3.77)	(-24.27, 17.00)	(-6.85, 43.33)	(-3.15, 9.53)	(-6.85, 3.87)
1-PHE	Q1 <0.65	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 0.65~	1.51	-0.30	4.29	1.51	8.22	25.11	2.63	1.51
		(-0.80, 3.87)	(-4.02, 3.67)	(-0.60, 9.53)	(-3.25, 6.40)	(-4.97, 23.12)	(-1.78, 59.36)	(-3.92, 9.75)	(-3.25, 6.50)
	Q3 0.99~	0.30	-1.88	4.08	-0.80	-5.07	-15.63	4.71	-0.80
		(-2.86, 3.56)	(-5.82, 2.33)	(-1.39, 9.75)	(-4.88, 3.46)	(-17.30, 8.87)	(-32.43, 5.23)	(-1.88, 11.85)	(-4.88, 3.46)
	Q4 1.53~	2.02	-3.54	8.76*	2.74	1.21	25.61*	11.18*	2.74
		(-1.49, 5.55)	(-7.87, 1.01)	(1.31, 16.88)	(-4.30, 10.19)	(-16.47, 22.63)	(4.92, 50.53)	(1.92, 21.29)	(-4.30, 10.19)
2-PHE	Q1 <0.31	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 0.31~	1.21	-1.59	4.81*	0.70	5.13	-29.95*	2.84	0.70
		(-1.78, 4.29)	(-5.45, 2.43)	(0.60, 9.20)	(-4.78, 6.50)	(-9.61, 22.26)	(-48.52, -4.69)	(-2.66, 8.76)	(-4.88, 6.50)
	Q3 0.47~	-1.19	-2.18	5.44*	2.43	-11.84	5.87	3.98	2.43
		(-4.02, 1.71)	(-6.29, 2.12)	(0.20, 11.07)	(-3.15, 8.33)	(-24.27, 2.53)	(-10.77, 25.48)	(-2.47, 10.85)	(-3.15, 8.33)
	Q4 0.74~	2.12	-4.11	5.65	-0.20	-9.61	-5.92	9.09	-0.20
		(-2.76, 7.25)	(-9.15, 1.21)	(-2.08, 13.88)	(-6.57, 6.61)	(-25.32, 9.31)	(-21.57, 12.98)	(-0.20, 19.36)	(-6.57, 6.61)
1-PYR	Q1 <0.76	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 0.76~	-1.49	-1.69	5.13	-2.18	-5.92	32.18	4.81	-2.18
		(-4.69, 1.71)	(-5.92, 2.63)	(-0.90, 11.40)	(-7.41, 3.46)	(-21.89, 13.20)	(-11.31, 96.80)	(-2.96, 13.09)	(-7.50, 3.46)
	Q3 1.18~	1.01	-2.37	5.97*	-2.37	-18.54*	6.18	7.25*	-2.27

		(-2.76, 4.92)	(-6.20, 1.51)	(0.90, 11.29)	(-6.57, 2.12)	(-33.30, -0.50)	(-20.86, 42.33)	(0.60, 14.34)	(-6.57, 2.12)
	Q4 1.87~	1.71	-0.20	7.14*	-2.57	-14.36	27.25	7.68*	-2.57
		(-1.39, 5.02)	(-6.01, 5.87)	(1.31, 13.31)	(-7.60, 2.74)	(-33.77, 10.74)	(-3.54, 67.87)	(0.50, 15.26)	(-7.60, 2.74)
9-FLU	Q1 <1.28	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 1.28~	0.60	-3.54	4.92*	-3.44	8.22	-18.13	7.90*	-3.44
		(-2.27, 3.56)	(-8.42, 1.51)	(0.40, 9.75)	(-7.60, 0.90)	(-0.60, 24.98)	(-42.31, 16.07)	(0.40, 15.95)	(-7.69, 0.90)
	Q3 2.02~	0.00	-3.25	4.60	-1.98	-8.52	9.09	7.25*	-1.98
		(-3.25, 3.36)	(-7.41, 1.01)	(-0.60, 9.97)	(-6.57, 2.84)	(-20.23, 4.81)	(-14.02, 38.26)	(0.10, 14.91)	(-6.57, 2.84)
	Q4 3.46~	0.20	-5.45	10.52*	-0.70	-6.20	8.98	14.91*	-0.70
		(-3.15, 3.67)	(-11.13, 0.60)	(0.90, 21.05)	(-7.41, 6.40)	(-28.11, 22.26)	(-9.88, 31.78)	(1.61, 29.95)	(-7.41, 6.50)

[1]Percentage change (%), β (95% CIs).

[2]Concentrations of creatinine-adjusted OH-PAHs (ng/g Cr).

Models were adjusted for age, gender, race, BMI z-score, smoking status, iodine, PIR.

1-NAP, 1-hydroxynaphthalene; 2-NAP, 2-hydroxynaphthalene; 3-FLU, 3-hydroxyfluorene; 2-FLU, 2-hydroxyfluorene; 3-PHE, 3-hydroxyphenanthrene; 1-PHE, 1-hydroxyphenanthrene; 2-PHE, 2-hydroxyphenanthrene; 1-PYR, 1-hydroxypyrene; 9-FLU, 9-hydroxyfluorene; FT3, free triiodothyronine; FT4, free thyroxine; TT3, total triiodothyronine; TT4, total thyroxine, TSH, thyroid-stimulating hormone; Tg, thyroglobulin; G_D, sum activity of peripheral deiodinases as SPINA-GD; G_T, thyroid's secretory capacity as SPINA-GT.

* $p < 0.05$.

Table S7. Associations between OH-PAHs quartiles and thyroid measurements in adults[1].

OH-PAHs	Quartile[2]	FT3	FT4	TT3	TT4	TSH	Tg	G_D	G_T
1-NAP	Q1 <8.27	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 8.27~	-1.29	-2.66*	-2.66	-1.29	4.60	-11.04	-0.70	-1.29
		(-2.76, 0.20)	(-5.16, -0.10)	(-6.39, 1.31)	(-3.82, 1.21)	(-4.69, 14.68)	(-25.32, 6.08)	(-5.16, 3.98)	(-3.82, 1.21)
	Q3 18.79~	-1.09	-0.50	-2.66	-1.19	4.39	-12.01	-3.63	-1.19
		(-2.86, 0.60)	(-3.54, 2.63)	(-6.20, 1.01)	(-4.11, 1.82)	(-6.11, 16.18)	(-28.39, 8.11)	(-9.88, 3.05)	(-4.21, 1.92)

	Q4 64.66~	0.60	2.43	-1.00	0.80	-1.59	0.00	-3.34	0.90
		(-1.29, 2.53)	(-1.00, 6.08)	(-5.07, 3.15)	(-3.63, 5.44)	(-12.63, 10.85)	(-15.13, 17.70)	(-9.79, 3.67)	(-3.54, 5.55)
2-NAP	Q1 <22.51	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 22.51~	-0.70	1.01	-1.29	0.50	-3.25	-12.01	-3.82	0.50
		(-2.18, 0.90)	(-1.49, 3.56)	(-4.02, 1.51)	(-2.27, 3.36)	(-11.93, 6.29)	(-24.27, 2.22)	(-8.33, 0.90)	(-2.37, 3.36)
	Q3 43.55~	1.51	0.40	1.21	1.51	-1.59	-12.89	-0.20	1.51
		(-0.10, 3.25)	(-2.37, 3.25)	(-1.59, 4.08)	(-1.00, 4.19)	(-10.24, 7.90)	(-24.87, 1.11)	(-5.07, 5.02)	(-1.09, 4.19)
	Q4 91.01~	2.43*	2.22	2.33	2.94*	-10.33*	3.67	-1.19	3.15*
		(0.60, 4.29)	(-0.40, 4.92)	(-1.09, 5.87)	(0.00, 5.97)	(-17.72, -2.37)	(-13.76, 24.48)	(-6.67, 4.71)	(0.20, 6.18)
3-FLU	Q1 <0.49	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 0.49~	-0.60	0.80	-2.96*	-1.49	-0.10	-10.42	-6.01*	-1.49
		(-1.98, 0.80)	(-1.49, 3.05)	(-5.64, -0.30)	(-3.82, 0.80)	(-6.76, 7.04)	(-23.43, 4.81)	(-10.33, -1.49)	(-3.82, 0.80)
	Q3 0.81~	-0.90	1.21	-2.66	-2.18	5.97	-16.72*	-5.16	-2.27
		(-2.76, 1.01)	(-1.39, 3.98)	(-6.39, 1.31)	(-5.26, 1.01)	(-1.88, 14.57)	(-28.04, -3.63)	(-10.60, 0.60)	(-5.35, 0.90)
	Q4 2.26~	0.50	1.92	-0.80	-1.59	-6.76	-1.98	-4.78	-1.49
		(-1.49, 2.63)	(-1.78, 5.76)	(-4.97, 3.56)	(-6.01, 2.94)	(-16.05, 3.56)	(-26.07, 30.08)	(-11.84, 2.84)	(-5.92, 3.15)
2-FLU	Q1 <1.42	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 1.42~	-0.30	1.41	-0.70	0.90	4.81	-15.04*	-3.44	0.80
		(-1.69, 1.11)	(-1.00, 3.87)	(-3.44, 2.02)	(-1.78, 3.56)	(-3.82, 14.11)	(-25.77, -2.66)	(-8.24, 1.51)	(-1.78, 3.46)
	Q3 2.26~	-0.90	1.01	-1.09	1.21	13.66*	-13.06	-3.34	1.11
		(-2.18, 0.50)	(-1.29, 3.36)	(-3.73, 1.51)	(-1.49, 3.87)	(3.56, 24.73)	(-24.50, 0.10)	(-8.61, 2.33)	(-1.49, 3.77)
	Q4 5.18~	0.20	0.50	0.60	-0.90	-8.88	-9.79	-0.90	-0.80
		(-1.49, 1.92)	(-2.08, 3.15)	(-2.66, 3.98)	(-5.16, 3.56)	(-17.72, 0.90)	(-30.65, 17.35)	(-6.95, 5.55)	(-5.07, 3.67)

3-PHE	Q1 <0.46	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 0.46~	0.60	2.02	-1.49	1.51	8.11*	-12.63	-3.63	1.41
		(-0.80, 2.12)	(-0.40, 4.60)	(-3.92, 1.01)	(-1.59, 4.71)	(0.20, 16.77)	(-24.87, 1.61)	(-8.24, 1.31)	(-1.59, 4.60)
	Q3 0.75~	-0.60	-0.60	-3.15*	-3.44*	12.75*	-12.37	-3.25	-3.44*
		(-1.88, 0.60)	(-2.86, 1.82)	(-5.16, -1.09)	(-6.39, -0.40)	(3.87, 22.38)	(-26.21, 4.08)	(-7.78, 1.61)	(-6.48, -0.40)
	Q4 1.37~	-0.20	2.02	-1.78	-0.40	-5.92	-6.57	-5.73*	-0.30
		(-1.59, 1.31)	(-0.40, 4.60)	(-4.59, 1.21)	(-4.30, 3.56)	(-14.10, 3.05)	(-20.94, 10.41)	(-11.04, -0.10)	(-4.21, 3.67)
1-PHE	Q1 <0.83	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 0.83~	0.80	-1.59	-0.40	-2.37	4.29	-2.08	2.74	-2.37
		(-0.70, 2.33)	(-4.11, 1.01)	(-3.54, 2.84)	(-5.26, 0.60)	(-7.41, 17.35)	(-16.97, 15.60)	(-3.25, 9.20)	(-5.26, 0.60)
	Q3 1.30~	1.92*	-1.39	1.51	-2.27	9.64	-12.98*	3.98	-2.37
		(0.30, 3.46)	(-3.82, 1.21)	(-1.98, 5.13)	(-5.82, 1.41)	(-1.59, 22.26)	(-21.89, -3.05)	(-2.66, 11.18)	(-5.92, 1.41)
	Q4 2.13~	1.41	-1.00	1.01	-0.80	1.31	-2.47	2.33	-0.70
		(-0.40, 3.25)	(-3.82, 1.92)	(-1.88, 4.08)	(-3.73, 2.33)	(-12.28, 17.00)	(-15.21, 12.08)	(-4.21, 9.31)	(-3.63, 2.43)
2-PHE	Q1 <0.41	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 0.41~	0.50	-0.10	2.63	0.30	2.53	-3.73	5.97*	0.20
		(-0.80, 1.82)	(-1.98, 1.82)	(-0.10, 5.34)	(-2.86, 3.46)	(-6.11, 11.96)	(-17.80, 12.64)	(1.41, 10.63)	(-2.96, 3.46)
	Q3 0.64~	0.90	-1.19	0.90	-0.40	8.55*	-7.78	1.92	-0.40
		(-0.90, 2.74)	(-3.15, 0.90)	(-2.37, 4.19)	(-3.63, 3.05)	(0.60, 17.23)	(-20.71, 7.36)	(-3.63, 7.90)	(-3.73, 2.94)
	Q4 1.07~	0.20	-0.50	2.02	1.01	-3.25	-2.76	3.67	1.11
		(-1.19, 1.51)	(-2.47, 1.41)	(-1.09, 5.23)	(-3.34, 5.44)	(-13.93, 8.76)	(-18.21, 15.60)	(-1.98, 9.53)	(-3.15, 5.55)
1-PYR	Q1 <0.63	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.

	Q2 0.63~	-1.09	-0.10	-0.80	-1.49	-2.66	9.20	-1.29	-1.59
		(-2.47, 0.30)	(-1.98, 1.82)	(-3.34, 1.71)	(-4.50, 1.51)	(-10.77, 6.29)	(-5.92, 26.74)	(-5.54, 3.15)	(-4.50, 1.51)
	Q3 1.05~	0.10	-0.20	0.60	-0.60	2.53	2.02	-1.59	-0.70
		(-1.19, 1.51)	(-2.27, 2.02)	(-1.69, 2.94)	(-2.86, 1.71)	(-4.50, 9.97)	(-10.77, 16.65)	(-5.92, 2.94)	(-2.96, 1.61)
	Q4 1.88~	0.70	1.71	1.31	-0.20	-7.04	10.85	-2.66	-0.10
		(-0.60, 2.02)	(-0.20, 3.67)	(-1.49, 4.19)	(-3.44, 3.15)	(-15.30, 1.92)	(-5.45, 29.95)	(-8.42, 3.56)	(-3.25, 3.25)
9-FLU	Q1 <1.73	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
	Q2 1.73~	-0.30	0.30	0.70	-1.00	0.90	-6.95	-0.50	-1.00
		(-1.98, 1.31)	(-2.18, 2.94)	(-2.27, 3.77)	(-3.34, 1.41)	(-6.76, 9.31)	(-23.51, 13.20)	(-4.97, 4.19)	(-3.34, 1.41)
	Q3 2.88~	-0.20	-1.78	1.82	-2.18	3.98	-3.25	2.94	-2.18
		(-1.59, 1.21)	(-4.69, 1.21)	(-0.70, 4.29)	(-4.50, 0.30)	(-4.50, 13.31)	(-17.96, 14.00)	(-1.98, 8.11)	(-4.50, 0.20)
	Q4 5.44~	-0.90	0.50	0.40	-1.39	-5.64	-5.07	-2.08	-1.29
		(-2.18, 0.40)	(-1.69, 2.74)	(-2.27, 3.05)	(-4.97, 2.33)	(-14.36, 3.87)	(-22.04, 15.49)	(-6.85, 2.84)	(-4.88, 2.43)

[1]Percentage change (%), β (95% CIs).

[2]Concentrations of creatinine-adjusted OH-PAHs (ng/g Cr).

Models were adjusted for age, gender, race, BMI, smoking status, iodine, PIR.

1-NAP, 1-hydroxynaphthalene; 2-NAP, 2-hydroxynaphthalene; 3-FLU, 3-hydroxyfluorene; 2-FLU, 2-hydroxyfluorene; 3-PHE, 3-hydroxyphenanthrene; 1-PHE, 1-hydroxyphenanthrene; 2-PHE, 2-hydroxyphenanthrene; 1-PYR, 1-hydroxypyrene; 9-FLU, 9-hydroxyfluorene; FT3, free triiodothyronine; FT4, free thyroxine; TT3, total triiodothyronine; TT4, total thyroxine, TSH, thyroid-stimulating hormone; Tg, thyroglobulin; G_D, sum activity of peripheral deiodinases as SPINA-GD; G_T, thyroid's secretory capacity as SPINA-GT.

* $p < 0.05$

Table S8. Associations of PAHs index with THs and related endpoints in adolescents by sex.

Adolescents	Direction	FT3	FT4	TT3	TT4	TSH	Tg	G_D	G_T

		β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)
Males	P	-0.001 (-0.017, 0.015)	-0.010 (-0.039, 0.020)	0.001 (-0.08, 0.011)	-0.011 (-0.045, 0.022)	-0.059 (-0.156, 0.037)	0.136 (-0.008, 0.280)	0.013 (-0.027, 0.053)	-0.011 (-0.045, 0.022)
	N	0.009 (-0.008, 0.026)	-0.008 (-0.033, 0.017)	-0.008 (-0.035, 0.019)	-0.026 (-0.053, 0.001)	-0.113* (-0.208, -0.019)	0.058 (-0.089, 0.205)	0.029 (-0.014, 0.071)	-0.026 (-0.053, 0.001)
Females	P	0.003 (-0.014, 0.021)	-0.003 (-0.030, 0.025)	0.016 (-0.016, 0.047)	0.011 (-0.021, 0.043)	-0.089 (-0.200, 0.022)	0.021 (-0.150, 0.192)	0.028 (-0.021, 0.076)	0.011 (-0.021, 0.044)
	N	-0.007 (-0.030, 0.016)	-0.005 (-0.034, 0.025)	-0.010 (-0.047, 0.026)	-0.015 (-0.053, 0.023)	-0.090 (-0.206, 0.026)	-0.087 (-0.297, 0.123)	-0.005 (-0.059, 0.050)	-0.014 (-0.053, 0.024)

Adjusted covariates: age, race, BMI z-score, smoking status, iodine, PIR.

P, positive; N, negative.

*p<0.05

Table S9. Associations of PAHs index with THs and related endpoints in adults by sex.

Adults	Direction	FT3	FT4	TT3	TT4	TSH	Tg	G_D	G_T
		β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)
Males	P	0.005 (-0.005, 0.014)	-0.002 (-0.018, 0.014)	0.002 (-0.015, 0.019)	-0.006 (-0.027, 0.016)	-0.028 (-0.081, 0.024)	0.030 (-0.074, 0.134)	0.007 (-0.025, 0.038)	-0.005 (-0.027, 0.016)
	N	0.003 (-0.006, 0.012)	-0.015* (-0.028, -0.002)	-0.002 (-0.019, 0.016)	-0.010 (-0.026, 0.006)	-0.012* (-0.063, -0.040)	0.073 (-0.007, 0.153)	0.010 (-0.023, 0.042)	-0.005 (-0.027, 0.016)
Females	P	0.017*	0.018	0.027*	0.029*	-0.026	0.079	0.023	0.033*

		(0.003, 0.030)	(-0.002, 0.038)	(0.008, 0.047)	(0.007, 0.052)	(-0.094, 0.043)	(-0.035, 0.193)	(-0.008, 0.054)	(0.009, 0.056)
	N	0.009	-0.002	0.007	0.004	-0.103*	0.009	-0.001	0.006
		(-0.003, 0.021)	(-0.018, 0.015)	(-0.013, 0.026)	(-0.015, 0.024)	(-0.170, -0.036)	(-0.097, 0.114)	(-0.038, 0.036)	(-0.014, 0.027)

Adjusted covariates: age, race, BMI, smoking status, iodine, PIR.

P, positive; N, negative.

*p<0.05

Table S10. Associations of PAHs index with THs and related endpoints in adults by smoking status.

Adults	Direction	FT3	FT4	TT3	TT4	TSH	Tg	G_D	G_T
		β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)	β (95%CI)
Non-smoker	P	0.009*	0.001	0.022*	-0.004	-0.041	-0.053	0.029*	-0.003
		(0.001, 0.016)	(-0.012, 0.014)	(0.009, 0.035)	(-0.019, 0.011)	(-0.084, 0.002)	(-0.124, 0.018)	(0.008, 0.050)	(-0.018, 0.012)
	N	0.006	-0.015*	0.004	-0.016*	-0.027	-0.037	-0.011	-0.015*
	□	(-0.003, 0.014)	(-0.026, -0.005)	(-0.010, 0.018)	(-0.028, -0.003)	(-0.068, 0.015)	(-0.114, 0.039)	(0.014, 0.038)	(-0.028, -0.002)
Smoker	P	-0.001	0.007	0.010	0.012	-0.035	0.140*	0.006	0.012
		(-0.015, 0.013)	(-0.014, 0.027)	(-0.013, 0.032)	(-0.011, 0.035)	(-0.107, 0.037)	(0.042, 0.237)	(-0.031, 0.044)	(-0.012, 0.036)
	N	-0.004	-0.002	-0.001	-0.006	-0.059	0.151*	-0.001	-0.007
		(-0.016, 0.009)	(-0.020, 0.017)	(-0.019, 0.017)	(-0.028, 0.016)	(-0.145, 0.026)	(0.050, 0.253)	(-0.037, 0.035)	(-0.030, 0.016)

Adjusted covariates: age, gender, race, BMI, iodine, PIR.

P, positive; N, negative.

*p<0.05

Table S11. Estimated WQS weights of PAHs for the associations with THs and related endpoints in adolescents and adults.

Age groups	Direction	Chemicals	FT3	FT4	TT3	TT4	TSH	Tg	G_D	G_T
Adolescents		1-NAP	0.05	0.61	0.00	0.30	0.12	0.04	0.00	0.30
		2-NAP	0.14	0.14	0.04	0.49	0.08	0.15	0.06	0.49
		3-FLU	0.04	0.17	0.02	0.11	0.00	0.01	0.05	0.11
		2-FLU	0.01	0.01	0.03	0.03	0.00	0.00	0.00	0.04
	Positive	3-PHE	0.24	0.00	0.03	0.02	0.29	0.00	0.13	0.01
		1-PHE	0.11	0.02	0.21	0.02	0.12	0.02	0.37	0.02
		2-PHE	0.00	0.01	0.04	0.01	0.05	0.31	0.02	0.01
		1-PYR	0.04	0.03	0.40	0.01	0.00	0.16	0.24	0.01
		9-FLU	0.37	0.01	0.23	0.01	0.34	0.31	0.13	0.01
		1-NAP	0.15	0.00	0.33	0.00	0.06	0.43	0.75	0.00
		2-NAP	0.20	0.13	0.41	0.00	0.33	0.17	0.10	0.00
		3-FLU	0.24	0.00	0.12	0.02	0.05	0.07	0.01	0.01
		2-FLU	0.04	0.07	0.05	0.04	0.18	0.10	0.10	0.04
	Negative	3-PHE	0.00	0.43	0.01	0.07	0.00	0.22	0.00	0.07
		1-PHE	0.00	0.04	0.01	0.04	0.01	0.00	0.00	0.05
		2-PHE	0.29	0.07	0.05	0.12	0.05	0.00	0.04	0.12
		1-PYR	0.08	0.05	0.01	0.46	0.30	0.01	0.00	0.46
		9-FLU	0.00	0.21	0.01	0.25	0.02	0.00	0.00	0.25
Adults	Positive	1-NAP	0.61	0.03	0.22	0.06	0.11	0.25	0.12	0.05

		2-NAP	0.23	0.58	0.21	0.67	0.17	0.46	0.07	0.68
		3-FLU	0.09	0.16	0.01	0.00	0.05	0.04	0.02	0.01
		2-FLU	0.07	0.02	0.06	0.14	0.04	0.00	0.10	0.12
		3-PHE	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.00
		1-PHE	0.00	0.00	0.03	0.00	0.36	0.01	0.43	0.00
		2-PHE	0.00	0.00	0.00	0.01	0.12	0.00	0.02	0.01
		1-PYR	0.00	0.20	0.47	0.12	0.11	0.09	0.17	0.13
		9-FLU	0.00	0.00	0.00	0.00	0.01	0.15	0.07	0.00
	Negative	1-NAP	0.00	0.09	0.03	0.12	0.13	0.02	0.04	0.11
		2-NAP	0.00	0.00	0.02	0.00	0.07	0.01	0.16	0.00
		3-FLU	0.04	0.01	0.06	0.07	0.06	0.03	0.05	0.08
		2-FLU	0.20	0.02	0.00	0.00	0.24	0.17	0.01	0.00
		3-PHE	0.01	0.02	0.61	0.07	0.09	0.34	0.72	0.08
		1-PHE	0.00	0.26	0.04	0.38	0.02	0.07	0.00	0.36
		2-PHE	0.30	0.03	0.04	0.02	0.10	0.35	0.00	0.03
		1-PYR	0.01	0.01	0.00	0.02	0.19	0.00	0.01	0.03
		9-FLU	0.44	0.56	0.20	0.32	0.10	0.01	0.01	0.31

Adjusted covariates: age, gender, race, BMI z-score (BMI in adults), smoking status, iodine, PIR.

Table S12. Estimated WQS weights of PAHs for the associations with THs and related endpoints in adolescents by sex.

Adolescents	Direction	Chemicals	FT3	FT4	TT3	TT4	TSH	Tg	G_D	G_T
Males	Positive	1-NAP	0.01	0.25	0.01	0.32	0.33	0.01	0.00	0.33
		2-NAP	0.11	0.37	0.21	0.27	0.01	0.10	0.13	0.28

		3-FLU	0.22	0.01	0.14	0.03	0.02	0.04	0.19	0.03
		2-FLU	0.18	0.04	0.03	0.32	0.01	0.00	0.01	0.33
		3-PHE	0.00	0.00	0.00	0.00	0.02	0.02	0.01	0.00
		1-PHE	0.15	0.01	0.14	0.00	0.05	0.58	0.27	0.00
		2-PHE	0.02	0.00	0.01	0.00	0.10	0.00	0.05	0.00
		1-PYR	0.26	0.26	0.34	0.03	0.08	0.24	0.26	0.03
		9-FLU	0.05	0.06	0.12	0.03	0.38	0.01	0.08	0.00
		1-NAP	0.55	0.03	0.39	0.39	0.02	0.00	0.52	0.02
		2-NAP	0.33	0.03	0.21	0.22	0.56	0.18	0.05	0.02
		3-FLU	0.00	0.06	0.00	0.15	0.02	0.06	0.00	0.00
		2-FLU	0.00	0.01	0.06	0.13	0.23	0.55	0.32	0.00
	Negative	3-PHE	0.08	0.26	0.24	0.07	0.04	0.00	0.08	0.39
		1-PHE	0.00	0.46	0.00	0.02	0.03	0.00	0.00	0.13
		2-PHE	0.00	0.09	0.07	0.02	0.01	0.03	0.03	0.22
		1-PYR	0.00	0.05	0.03	0.00	0.08	0.12	0.00	0.15
		9-FLU	0.04	0.01	0.00	0.00	0.01	0.06	0.00	0.07
Females		1-NAP	0.01	0.03	0.02	0.03	0.52	0.02	0.08	0.03
		2-NAP	0.02	0.08	0.02	0.19	0.02	0.10	0.05	0.20
		3-FLU	0.00	0.18	0.00	0.00	0.14	0.15	0.02	0.00
		2-FLU	0.00	0.18	0.00	0.04	0.00	0.17	0.03	0.04
	Positive	3-PHE	0.03	0.01	0.00	0.01	0.10	0.08	0.00	0.01
		1-PHE	0.00	0.28	0.21	0.66	0.00	0.07	0.02	0.65
		2-PHE	0.00	0.11	0.01	0.01	0.13	0.01	0.00	0.01
		1-PYR	0.71	0.13	0.43	0.03	0.05	0.33	0.22	0.04
		9-FLU	0.23	0.00	0.31	0.03	0.04	0.07	0.58	0.02
	Negative	1-NAP	0.30	0.24	0.21	0.26	0.02	0.29	0.12	0.27

		2-NAP	0.21	0.09	0.14	0.10	0.31	0.34	0.20	0.09
		3-FLU	0.20	0.01	0.32	0.28	0.00	0.03	0.22	0.26
		2-FLU	0.03	0.01	0.02	0.04	0.06	0.00	0.16	0.04
		3-PHE	0.09	0.05	0.31	0.13	0.01	0.06	0.08	0.13
		1-PHE	0.02	0.01	0.00	0.00	0.26	0.06	0.17	0.00
		2-PHE	0.15	0.00	0.00	0.02	0.01	0.14	0.04	0.03
		1-PYR	0.00	0.06	0.00	0.05	0.23	0.05	0.01	0.05
		9-FLU	0.00	0.53	0.00	0.12	0.10	0.03	0.00	0.13

Adjusted covariates: age, race, BMI z-score, smoking status, iodine, PIR.

Table S13. Estimated WQS weights of PAHs for the associations with THs and related endpoints in adults by sex.

Adults	Direction	Chemicals	FT3	FT4	TT3	TT4	TSH	Tg	G_D	G_T
Males		1-NAP	0.11	0.04	0.07	0.19	0.00	0.43	0.01	0.19
		2-NAP	0.06	0.49	0.13	0.31	0.11	0.18	0.22	0.32
		3-FLU	0.16	0.06	0.11	0.07	0.53	0.11	0.08	0.06
		2-FLU	0.15	0.28	0.01	0.21	0.23	0.01	0.00	0.20
	Positive	3-PHE	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.00
		1-PHE	0.28	0.00	0.14	0.00	0.11	0.03	0.17	0.00
		2-PHE	0.00	0.00	0.01	0.00	0.00	0.00	0.10	0.00
		1-PYR	0.23	0.10	0.50	0.22	0.00	0.20	0.37	0.23
		9-FLU	0.00	0.01	0.03	0.00	0.02	0.04	0.04	0.00
	Negative	1-NAP	0.10	0.09	0.22	0.02	0.06	0.01	0.28	0.02
		2-NAP	0.16	0.01	0.09	0.02	0.15	0.07	0.04	0.02

		3-FLU	0.00	0.03	0.00	0.01	0.03	0.00	0.02	0.01
		2-FLU	0.02	0.01	0.24	0.00	0.04	0.07	0.40	0.00
		3-PHE	0.06	0.03	0.22	0.21	0.04	0.70	0.14	0.21
		1-PHE	0.00	0.27	0.01	0.45	0.01	0.02	0.01	0.46
		2-PHE	0.10	0.05	0.03	0.04	0.00	0.06	0.01	0.04
		1-PYR	0.01	0.01	0.00	0.00	0.58	0.01	0.02	0.00
		9-FLU	0.55	0.50	0.19	0.25	0.09	0.06	0.08	0.24
Females		1-NAP	0.21	0.25	0.05	0.25	0.24	0.52	0.04	0.25
		2-NAP	0.18	0.09	0.12	0.20	0.00	0.04	0.02	0.22
		3-FLU	0.00	0.24	0.00	0.02	0.07	0.01	0.00	0.02
		2-FLU	0.00	0.01	0.07	0.30	0.02	0.00	0.10	0.26
	Positive	3-PHE	0.00	0.01	0.00	0.00	0.21	0.02	0.00	0.00
		1-PHE	0.38	0.01	0.24	0.12	0.41	0.00	0.40	0.16
		2-PHE	0.01	0.04	0.01	0.05	0.05	0.00	0.01	0.04
		1-PYR	0.20	0.35	0.50	0.04	0.00	0.40	0.38	0.03
		9-FLU	0.02	0.00	0.01	0.02	0.00	0.01	0.05	0.02
		1-NAP	0.02	0.02	0.13	0.08	0.02	0.00	0.07	0.07
		2-NAP	0.02	0.02	0.01	0.04	0.71	0.11	0.37	0.03
		3-FLU	0.26	0.00	0.21	0.13	0.05	0.01	0.23	0.14
		2-FLU	0.53	0.20	0.00	0.01	0.00	0.50	0.01	0.01
	Negative	3-PHE	0.02	0.13	0.50	0.38	0.00	0.02	0.32	0.40
		1-PHE	0.00	0.15	0.00	0.02	0.00	0.07	0.00	0.03
		2-PHE	0.01	0.03	0.00	0.02	0.03	0.17	0.00	0.02
		1-PYR	0.00	0.00	0.00	0.12	0.17	0.00	0.00	0.11
		9-FLU	0.14	0.45	0.15	0.20	0.02	0.12	0.00	0.19

Adjusted covariates: age, race, BMI, smoking status, iodine, PIR.

Table S14. Estimated WQS weights of PAHs for the associations with THs and related endpoints in adults by smoking status.

Adults	Direction	Chemicals	FT3	FT4	TT3	TT4	TSH	Tg	G_D	G_T
Non-smoker		1-NAP	0.01	0.20	0.01	0.46	0.18	0.01	0.00	0.45
		2-NAP	0.12	0.56	0.07	0.27	0.00	0.06	0.01	0.27
		3-FLU	0.00	0.09	0.00	0.01	0.06	0.02	0.00	0.01
		2-FLU	0.14	0.05	0.23	0.12	0.01	0.00	0.01	0.12
	Positive	3-PHE	0.00	0.00	0.00	0.00	0.12	0.00	0.01	0.00
		1-PHE	0.64	0.00	0.14	0.00	0.04	0.02	0.60	0.00
		2-PHE	0.01	0.00	0.22	0.13	0.14	0.13	0.17	0.13
		1-PYR	0.08	0.10	0.32	0.01	0.00	0.35	0.07	0.02
		9-FLU	0.00	0.00	0.01	0.00	0.45	0.41	0.13	0.00
		1-NAP	0.37	0.00	0.51	0.00	0.03	0.41	0.58	0.00
		2-NAP	0.10	0.00	0.11	0.01	0.80	0.12	0.30	0.01
		3-FLU	0.20	0.00	0.06	0.08	0.00	0.05	0.05	0.07
		2-FLU	0.00	0.00	0.00	0.00	0.07	0.26	0.03	0.00
	Negative	3-PHE	0.07	0.26	0.28	0.21	0.00	0.10	0.02	0.21
		1-PHE	0.00	0.06	0.00	0.26	0.04	0.04	0.00	0.25
		2-PHE	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00
		1-PYR	0.02	0.01	0.00	0.03	0.06	0.02	0.02	0.03
		9-FLU	0.21	0.60	0.04	0.41	0.00	0.00	0.00	0.43
Smoker		1-NAP	0.13	0.16	0.07	0.04	0.98	0.23	0.01	0.04
	Positive	2-NAP	0.23	0.10	0.31	0.12	0.00	0.08	0.08	0.13
		3-FLU	0.16	0.00	0.05	0.17	0.00	0.10	0.04	0.16

	2-FLU	0.06	0.00	0.23	0.51	0.00	0.41	0.29	0.49
	3-PHE	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1-PHE	0.10	0.02	0.07	0.04	0.00	0.03	0.29	0.03
	2-PHE	0.06	0.48	0.01	0.03	0.00	0.07	0.00	0.05
	1-PYR	0.20	0.22	0.25	0.09	0.00	0.07	0.23	0.10
	9-FLU	0.01	0.02	0.01	0.00	0.02	0.01	0.06	0.00
	1-NAP	0.00	0.01	0.00	0.00	0.00	0.01	0.21	0.00
	2-NAP	0.00	0.01	0.00	0.00	0.25	0.00	0.06	0.00
	3-FLU	0.00	0.01	0.00	0.00	0.14	0.07	0.03	0.00
	2-FLU	0.00	0.15	0.00	0.00	0.27	0.00	0.01	0.00
Negative	3-PHE	0.30	0.65	0.92	0.49	0.11	0.54	0.32	0.49
	1-PHE	0.00	0.07	0.08	0.00	0.00	0.00	0.00	0.00
	2-PHE	0.00	0.00	0.00	0.00	0.13	0.00	0.20	0.00
	1-PYR	0.70	0.00	0.00	0.03	0.09	0.00	0.01	0.04
	9-FLU	0.00	0.10	0.00	0.48	0.01	0.38	0.16	0.47

Adjusted covariates: age, gender, race, BMI, iodine, PIR.

Table S15. Interaction between PAHs and iodine status on thyroid measurements in adolescents by iodine status[1].

	1-NAP	2-NAP	3-FLU	2-FLU	3-PHE	1-PHE	2-PHE	1-PYR	9-FLU
FT3									
Adequate and above-requirements	-0.50 (-2.08, 1.11)	0.90 (-1.78, 3.67)	1.31 (-0.70, 3.36)	1.31 (-1.19, 3.77)	0.30 (-1.78, 2.33)	1.61 (-0.80, 3.98)	-0.40 (-2.86, 2.22)	1.51 (-0.20, 3.25)	-0.10 (-1.98, 1.92)
Insufficient	-1.29* (-2.57, 0.00)	-2.08 (-4.59, 0.50)	0.00 (-0.80, 2.74)	-0.20 (-3.54, 3.15)	0.40 (-2.66, 3.67)	-0.90 (-4.02, 2.43)	0.50 (-2.76, 3.87)	-1.29 (-3.63, 1.11)	1.11 (-0.70, 2.84)

Excessive	-1.29	3.05*	1.21	0.60	1.21	-0.20	0.60	1.41	-1.98
	(-3.54, 1.01)	(0.60, 5.65)	(-1.59, 4.19)	(-2.47, 3.87)	(-2.37, 4.81)	(-3.73, 3.36)	(-2.27, 3.46)	(-2.08, 4.92)	(-5.35, 1.41)
P-int	0.573	0.060	0.523	0.641	0.398	0.599	0.603	0.337	0.521
FT4									
Adequate and above-requirements	-0.60	0.80	-0.80	-1.88	-1.29	-1.00	-1.49	0.70	-3.25*
	(-3.25, 2.22)	(-2.27, 3.98)	(-3.63, 2.22)	(-5.26, 1.61)	(-4.30, 1.82)	(-4.97, 3.05)	(-5.35, 2.43)	(-2.57, 3.98)	(-6.11, -0.20)
Insufficient	2.63*	2.74	1.01	1.01	-1.78	-0.40	-0.40	1.31	-2.57
	(0.30, 5.13)	(0.00, 5.55)	(-1.69, 3.77)	(-3.05, 5.13)	(-5.54, 2.12)	(-4.11, 3.46)	(-4.02, 3.25)	(-3.25, 6.08)	(-5.45, 0.30)
Excessive	-0.10	-0.90	-3.92	-5.64*	-4.97	-5.54*	-6.29*	-3.44*	-2.27
	(-3.54, 3.46)	(-3.05, 1.41)	(-8.15, 0.50)	(-8.79, -2.37)	(-10.95, 1.51)	(-8.52, -2.47)	(-10.60, -1.78)	(-6.57, -0.10)	(-5.82, 1.41)
P-int	0.360	0.727	0.669	0.425	0.634	0.170	0.199	0.538	0.602
TT3									
Adequate and above-requirements	-0.80	0.90	2.63	4.29	2.53	6.82*	5.34*	4.81*	4.60*
	(-3.25, 1.82)	(-2.96, 5.02)	(-0.60, 5.97)	(0.00, 8.76)	(-1.09, 6.40)	(2.33, 11.52)	(1.01, 9.86)	(1.21, 8.44)	(0.40, 8.98)
Insufficient	-0.70	0.80	0.30	1.11	0.50	1.51	3.05	1.11	3.98*
	(-3.34, 1.92)	(-2.57, 4.19)	(-3.44, 4.08)	(-3.15, 5.55)	(-2.76, 3.98)	(-2.18, 5.34)	(-0.70, 6.82)	(-2.47, 4.71)	(0.80, 7.14)
Excessive	-3.15	1.61	-3.44	-0.70	-6.67*	-0.80	1.01	-2.86	0.80
	(-6.39, 0.10)	(-1.49, 4.81)	(-8.70, 2.02)	(-4.69, 3.36)	(-12.72, -0.30)	(-9.34, 8.55)	(-7.96, 10.85)	(-7.87, 2.43)	(-6.57, 8.65)
P-int	0.708	0.882	0.091	0.052	0.035	0.131	0.350	0.017	0.271
TT4									
Adequate and above-requirements	0.60	0.00	-1.29	-1.69	-1.69	0.30	-0.60	0.50	-2.96*
	(-1.59, 2.84)	(-3.54, 3.56)	(-4.59, 2.12)	(-5.35, 2.12)	(-4.97, 1.61)	(-3.54, 4.39)	(-4.30, 3.15)	(-2.66, 3.77)	(-5.07, -0.70)
Insufficient	2.12	3.36	0.50	1.92	-0.20	0.80	1.01	1.21	0.50
	(-1.00, 5.44)	(-0.30, 7.25)	(-3.34, 4.50)	(-3.44, 7.68)	(-6.01, 5.97)	(-4.21, 5.97)	(-4.11, 6.29)	(-2.37, 4.92)	(-3.34, 4.50)
Excessive	-0.20	1.01	-4.11	-2.18	-3.73	1.92	2.33	-2.76	1.01
	(-3.82, 3.67)	(-5.45, 7.79)	(-11.22, 3.56)	(-9.15, 5.23)	(-11.75, 5.02)	(-7.13, 11.74)	(-8.15, 14.11)	(-8.61, 3.56)	(-7.96, 10.74)

P-int	0.891	0.880	0.668	0.699	0.832	0.892	0.942	0.610	0.425
TSH									
Adequate and above-requirements	0.80 (-9.52, 12.41)	-11.40 (-23.97, 3.15)	-6.76 (-19.43, 7.79)	-6.48 (-21.81, 11.85)	-2.57 (-15.89, 12.75)	-0.20 (-13.58, 15.26)	-4.21 (-16.81, 10.30)	-6.39 (-19.43, 8.65)	-2.76 (-14.79, 10.85)
Insufficient	-0.60 (-6.95, 6.29)	-11.22* (-19.91, -1.59)	-7.69 (-14.79, 0.10)	-15.63* (-23.13, -7.41)	2.84 (-8.33, 15.37)	4.29 (-4.97, 14.45)	-1.49 (-12.63, 10.96)	-15.55* (-24.19, -5.92)	6.18 (-3.34, 16.65)
Excessive	-10.51 (-28.04, 11.18)	-7.32 (-21.73, 9.64)	-18.70 (-38.06, 6.82)	-20.94 (-39.95, 4.08)	-11.40 (-28.82, 10.41)	-21.65* (-38.49, -0.30)	-16.97* (-30.37, -1.00)	-16.31 (-32.29, 3.46)	-15.89* (-28.54, -1.00)
P-int	0.608	0.406	0.485	0.897	0.429	0.194	0.623	0.979	0.249
Tg									
Adequate and above-requirements	3.67 (-10.06, 19.48)	15.49 (-13.50, 54.19)	6.93 (-11.93, 29.82)	10.85 (-8.24, 33.78)	4.08 (-14.27, 26.24)	19.96 (-0.70, 44.92)	10.19 (-7.78, 31.78)	15.26 (-5.73, 40.78)	1.31 (-13.15, 18.18)
Insufficient	4.19 (-9.34, 19.60)	-4.02 (-16.97, 11.07)	15.49 (-3.25, 37.85)	14.91 (-6.57, 41.48)	10.74 (-10.51, 37.16)	18.89 (-16.89, 70.06)	34.31* (3.67, 74.02)	29.05* (8.22, 53.73)	9.53 (-14.36, 40.21)
Excessive	11.74 (-1.78, 27.12)	-5.54 (-20.86, 12.64)	-10.06 (-28.11, 12.52)	-12.10 (-28.54, 8.00)	-19.18 (-42.31, 13.20)	-10.24 (-29.95, 14.91)	-17.47 (-37.56, 9.20)	-12.01 (-31.55, 12.98)	4.92 (-12.54, 25.86)
P-int	0.343	0.208	0.768	0.678	0.403	0.577	0.215	0.296	0.693
G_D									
Adequate and above-requirements	-0.10 (-3.63, 3.56)	0.10 (-5.54, 6.08)	2.63 (-1.98, 7.57)	4.08 (-2.08, 10.63)	3.98 (-0.10, 8.33)	6.29 (-0.10, 12.98)	4.50 (-1.39, 10.74)	3.98 (-0.30, 8.44)	6.40* (0.20, 12.98)
Insufficient	-3.15* (-5.64, -0.50)	-2.27 (-6.95, 2.53)	1.92 (-3.34, 7.47)	1.82 (-5.54, 9.75)	3.77 (-2.27, 10.19)	4.29 (-2.27, 11.29)	4.19 (-2.27, 11.07)	1.31 (-4.40, 7.47)	5.55* (0.90, 10.52)
Excessive	-2.96 (-8.06, 2.33)	1.31 (-4.88, 7.79)	4.50 (-3.15, 12.86)	8.22* (1.21, 15.72)	0.70 (-7.60, 9.75)	7.57 (-2.57, 18.89)	9.64 (-1.69, 22.38)	0.80 (-5.73, 7.90)	5.65 (-4.50, 16.88)
P-int	0.619	0.991	0.970	0.747	0.766	0.884	0.884	0.786	0.893
G_T									

Adequate and above-requirements	0.60 (-1.59, 2.84)	0.00 (-3.54, 3.67)	-1.29 (-4.59, 2.22)	-1.69 (-5.35, 2.22)	-1.69 (-4.97, 1.61)	0.30 (-3.54, 4.39)	-0.70 (-4.30, 3.15)	0.50 (-2.57, 3.77)	-2.96* (-5.16, -0.70)
Insufficient	2.12 (-1.00, 5.44)	3.36 (-0.30, 7.25)	0.50 (-3.34, 4.50)	2.02 (-3.44, 7.68)	-0.20 (-6.01, 5.97)	0.80 (-4.21, 5.97)	1.01 (-4.11, 6.29)	1.21 (-2.37, 4.92)	0.50 (-3.34, 4.50)
Excessive	-0.10 (-3.82, 3.77)	1.01 (-5.35, 7.90)	-4.02 (-11.22, 3.77)	-2.08 (-9.06, 5.44)	-3.63 (-11.75, 5.13)	2.02 (-7.04, 11.96)	2.43 (-8.15, 14.22)	-2.66 (-8.61, 3.67)	1.01 (-7.87, 10.85)
P-int	0.911	0.890	0.690	0.724	0.849	0.879	0.940	0.617	0.427

[1]Percentage change (%), β (95% CIs).

P-int depicted the interaction of OH-PAHs and iodine status on thyroid measurements, estimated by multiple linear regression model.

Models were adjusted for age, gender, race, BMI z-score, smoking status, PIR.

1-NAP, 1-hydroxynaphthalene; 2-NAP, 2-hydroxynaphthalene; 3-FLU, 3-hydroxyfluorene; 2-FLU, 2-hydroxyfluorene; 3-PHE, 3-hydroxyphenanthrene; 1-PHE, 1-hydroxyphenanthrene; 2-PHE, 2-hydroxyphenanthrene; 1-PYR, 1-hydroxypyrene; 9-FLU, 9-hydroxyfluorene; FT3, free triiodothyronine; FT4, free thyroxine; TT3, total triiodothyronine; TT4, total thyroxine, TSH, thyroid-stimulating hormone; Tg, thyroglobulin; G_D, sum activity of peripheral deiodinases as SPINA-GD; G_T, thyroid's secretory capacity as SPINA-GT.

* $p < 0.05$.

Table S16. Interaction between PAHs and iodine status on thyroid measurements in adults by iodine status[1].

	1-NAP	2-NAP	3-FLU	2-FLU	3-PHE	1-PHE	2-PHE	1-PYR	9-FLU
FT3									
Adequate and above-requirements	0.40 (-0.20, 1.01)	0.30 (-0.70, 1.21)	-0.20 (-1.09, 0.70)	-0.50 (-1.49, 0.40)	-0.50 (-1.59, 0.60)	0.00 (-1.39, 1.31)	-0.30 (-1.49, 0.80)	-0.30 (-1.49, 1.01)	-0.40 (-1.49, 0.80)
Insufficient	0.00 (-0.90, 0.90)	1.61* (0.40, 2.84)	0.70 (-0.80, 2.12)	0.90 (-0.80, 2.63)	0.50 (-1.09, 2.02)	0.90 (-0.80, 2.63)	0.50 (-1.09, 2.02)	1.11 (-0.10, 2.43)	0.40 (-0.90, 1.82)
Excessive	-0.50 (-1.49, 0.50)	1.01 (-0.70, 2.63)	-0.10 (-1.59, 1.41)	-0.30 (-1.98, 1.41)	-0.80 (-2.47, 1.01)	-0.40 (-2.18, 1.51)	-1.19 (-3.05, 0.70)	-0.50 (-2.08, 1.11)	-0.60 (-2.18, 1.11)
P-int	0.087	0.223	0.229	0.153	0.243	0.252	0.288	0.193	0.247
FT4									

Adequate and	0.50	1.51*	1.01	0.60	0.20	0.50	0.30	1.11	-0.10
above-requirements	(-0.80, 1.82)	(0.30, 2.74)	(-0.30, 2.43)	(-0.70, 1.92)	(-1.59, 2.02)	(-1.09, 2.22)	(-1.59, 2.12)	(-0.20, 2.53)	(-1.69, 1.51)
Insufficient	0.00	2.22*	1.21	1.41	-0.40	0.20	1.11	1.01	-0.10
	(-1.49, 1.51)	(0.40, 3.98)	(-0.70, 3.25)	(-1.09, 3.87)	(-2.66, 1.92)	(-2.47, 2.94)	(-1.19, 3.36)	(-1.00, 2.94)	(-1.98, 1.82)
Excessive	1.41	2.12	0.70	-0.10	-1.78	-0.80	-0.80	2.33	-1.39
	(-0.60, 3.46)	(-0.40, 4.71)	(-2.76, 4.29)	(-3.63, 3.46)	(-5.35, 2.02)	(-4.59, 3.05)	(-4.78, 3.36)	(-1.19, 6.08)	(-3.82, 1.11)
P-int	0.144	0.803	0.771	0.974	0.641	0.668	0.865	0.603	0.813
TT3									
Adequate and	0.10	0.60	-0.20	-0.30	-1.69	-0.90	-0.20	-0.10	-0.70
above-requirements	(-1.29, 1.51)	(-1.19, 2.43)	(-1.98, 1.61)	(-2.08, 1.51)	(-4.02, 0.60)	(-3.25, 1.41)	(-2.18, 1.82)	(-1.98, 1.92)	(-2.47, 1.11)
Insufficient	-0.20	2.12	0.80	1.41	-0.50	0.30	1.41	1.01	0.30
	(-1.78, 1.41)	(-0.10, 4.50)	(-1.98, 3.77)	(-1.78, 4.81)	(-2.96, 2.02)	(-2.37, 3.05)	(-1.88, 4.92)	(-1.29, 3.25)	(-2.18, 2.84)
Excessive	-2.57*	1.01	-1.49	-1.29	-1.19	-0.10	1.01	0.60	0.50
	(-4.30, -0.90)	(-1.69, 3.87)	(-3.44, 0.40)	(-3.25, 0.80)	(-3.34, 1.01)	(-3.05, 2.84)	(-1.69, 3.77)	(-2.27, 3.56)	(-2.57, 3.67)
P-int	0.019	0.573	0.428	0.448	0.802	0.774	0.611	0.709	0.780
TT4									
Adequate and	-0.10	1.31	-0.60	0.00	-1.19	-1.09	-0.20	-1.09	-0.70
above-requirements	(-1.59, 1.51)	(-0.80, 3.56)	(-2.96, 1.92)	(-2.76, 2.74)	(-3.92, 1.61)	(-3.34, 1.21)	(-2.86, 2.63)	(-2.76, 0.70)	(-2.96, 1.51)
Insufficient	0.90	2.94*	1.41	3.25*	-0.70	-0.10	1.51	1.01	-0.70
	(-0.60, 2.43)	(1.11, 4.81)	(-0.90, 3.77)	(0.40, 6.18)	(-3.25, 1.92)	(-3.15, 2.94)	(-1.69, 4.81)	(-1.49, 3.56)	(-3.54, 2.33)
Excessive	0.10	2.53*	-1.69	-1.69	-1.59	-1.29	1.01	1.71	-1.00
	(-1.59, 1.71)	(0.40, 4.71)	(-3.92, 0.50)	(-4.02, 0.80)	(-5.07, 2.12)	(-4.02, 1.51)	(-2.57, 4.81)	(-1.29, 4.92)	(-4.50, 2.63)
P-int	0.761	0.496	0.233	0.085	0.798	0.777	0.467	0.343	0.829
TSH									
Adequate and	0.20	-4.88	-5.54*	-6.85*	-2.86	-2.57	-2.08	-4.02	-0.60
above-requirements	(-3.82, 4.39)	(-10.33, 0.90)	(-9.97, -0.80)	(-12.01, -1.39)	(-7.78, 2.43)	(-8.06, 3.25)	(-7.32, 3.36)	(-8.42, 0.60)	(-6.01, 5.13)

Insufficient	2.22 (-2.57, 7.14)	-3.44 (-8.61, 2.02)	5.87 (-1.78, 14.11)	6.08 (-3.25, 16.42)	5.87 (-1.69, 13.88)	5.44 (-3.44, 15.03)	3.05 (-5.07, 11.74)	6.18 (-1.29, 14.11)	-2.37 (-9.06, 4.81)
Excessive	-5.82 (-14.10, 3.25)	-6.76 (-19.10, 7.47)	-8.52 (-18.45, 2.53)	-6.67 (-17.63, 5.65)	-8.06 (-17.55, 2.43)	-6.95 (-18.70, 6.40)	-7.23 (-18.13, 5.02)	-11.84* (-19.83, -3.05)	-6.29 (-15.72, 4.29)
P-int	0.669	0.867	0.830	0.833	0.475	0.577	0.786	0.248	0.471
Tg									
Adequate and above-requirements	-1.00 (-5.64, 3.87)	-6.20 (-16.64, 5.44)	-0.70 (-10.06, 9.75)	-1.00 (-13.32, 13.09)	-8.33 (-19.02, 3.87)	-8.70 (-20.39, 4.71)	-9.06 (-22.35, 6.61)	2.43 (-5.35, 10.85)	-3.82 (-17.88, 12.64)
Insufficient	5.55 (-1.39, 13.09)	6.29 (-0.70, 13.88)	7.04 (-2.18, 17.23)	7.14 (-4.88, 20.68)	1.31 (-10.06, 14.22)	1.31 (-12.63, 17.47)	2.22 (-8.79, 14.57)	5.76 (-5.45, 18.18)	1.31 (-8.88, 12.75)
Excessive	-3.63 (-16.72, 11.63)	1.41 (-12.72, 17.82)	-9.61 (-25.17, 9.20)	-13.84 (-26.88, 1.41)	-2.37 (-14.02, 10.85)	-10.24 (-21.10, 2.22)	2.63 (-14.79, 23.49)	-0.40 (-13.41, 14.57)	-3.44 (-13.24, 7.47)
P-int	0.160	0.218	0.178	0.248	0.222	0.584	0.269	0.607	0.571
G_D									
Adequate and above-requirements	-0.30 (-2.47, 1.92)	0.50 (-2.96, 3.98)	-0.50 (-3.15, 2.22)	-0.80 (-4.11, 2.74)	-1.88 (-5.92, 2.22)	-1.59 (-5.45, 2.53)	0.00 (-3.73, 3.87)	-0.80 (-3.92, 2.43)	-0.60 (-3.34, 2.22)
Insufficient	-1.29 (-3.63, 1.01)	-1.39 (-4.97, 2.22)	-2.96 (-6.95, 1.11)	-2.76 (-6.76, 1.41)	-3.92* (-7.69, -0.10)	-2.76 (-6.48, 1.01)	-2.08 (-6.01, 2.02)	-3.25 (-7.13, 0.90)	-2.57 (-6.01, 1.01)
Excessive	-4.59* (-7.23, -1.78)	-0.80 (-5.73, 4.39)	-0.50 (-6.57, 5.97)	0.30 (-5.92, 6.93)	2.74 (-3.54, 9.31)	3.15 (-4.88, 11.96)	2.63 (-4.88, 10.74)	-1.09 (-7.87, 6.08)	2.53 (-3.15, 8.55)
P-int	0.004	0.729	0.907	0.885	0.631	0.621	0.866	0.963	0.850
G_T									
Adequate and above-requirements	0.00 (-1.59, 1.51)	1.41 (-0.70, 3.56)	-0.50 (-2.86, 1.92)	0.00 (-2.66, 2.74)	-1.19 (-3.82, 1.61)	-1.09 (-3.34, 1.21)	-0.20 (-2.86, 2.63)	-1.00 (-2.76, 0.70)	-0.70 (-2.96, 1.51)
Insufficient	0.90 (-0.60, 2.43)	3.05* (1.11, 5.02)	1.51 (-0.80, 3.98)	3.46* (0.50, 6.40)	-0.50 (-3.15, 2.12)	0.00 (-3.15, 3.25)	1.61 (-1.59, 5.02)	1.11 (-1.49, 3.77)	-0.60 (-3.54, 2.53)

Excessive	0.10 (-1.49, 1.82)	2.63* (0.50, 4.71)	-1.69 (-3.92, 0.50)	-1.69 (-4.02, 0.80)	-1.59 (-5.07, 2.12)	-1.29 (-4.02, 1.51)	1.01 (-2.66, 4.71)	1.82 (-1.29, 4.92)	-1.00 (-4.50, 2.63)
P-int	0.763	0.476	0.211	0.076	0.751	0.743	0.439	0.357	0.801

[1]Percentage change (%), β (95% CIs).

P-int depicted the interaction of OH-PAHs and iodine status on thyroid measurements, estimated by multiple linear regression model.

Models were adjusted for age, gender, race, BMI, smoking status, PIR.

1-NAP, 1-hydroxynaphthalene; 2-NAP, 2-hydroxynaphthalene; 3-FLU, 3-hydroxyfluorene; 2-FLU, 2-hydroxyfluorene; 3-PHE, 3-hydroxyphenanthrene; 1-PHE, 1-hydroxyphenanthrene; 2-PHE, 2-hydroxyphenanthrene; 1-PYR, 1-hydroxypyrene; 9-FLU, 9-hydroxyfluorene; FT3, free triiodothyronine; FT4, free thyroxine; TT3, total triiodothyronine; TT4, total thyroxine, TSH, thyroid-stimulating hormone; Tg, thyroglobulin; G_D, sum activity of peripheral deiodinases as SPINA-GD; G_T, thyroid's secretory capacity as SPINA-GT.

* $p < 0.05$.

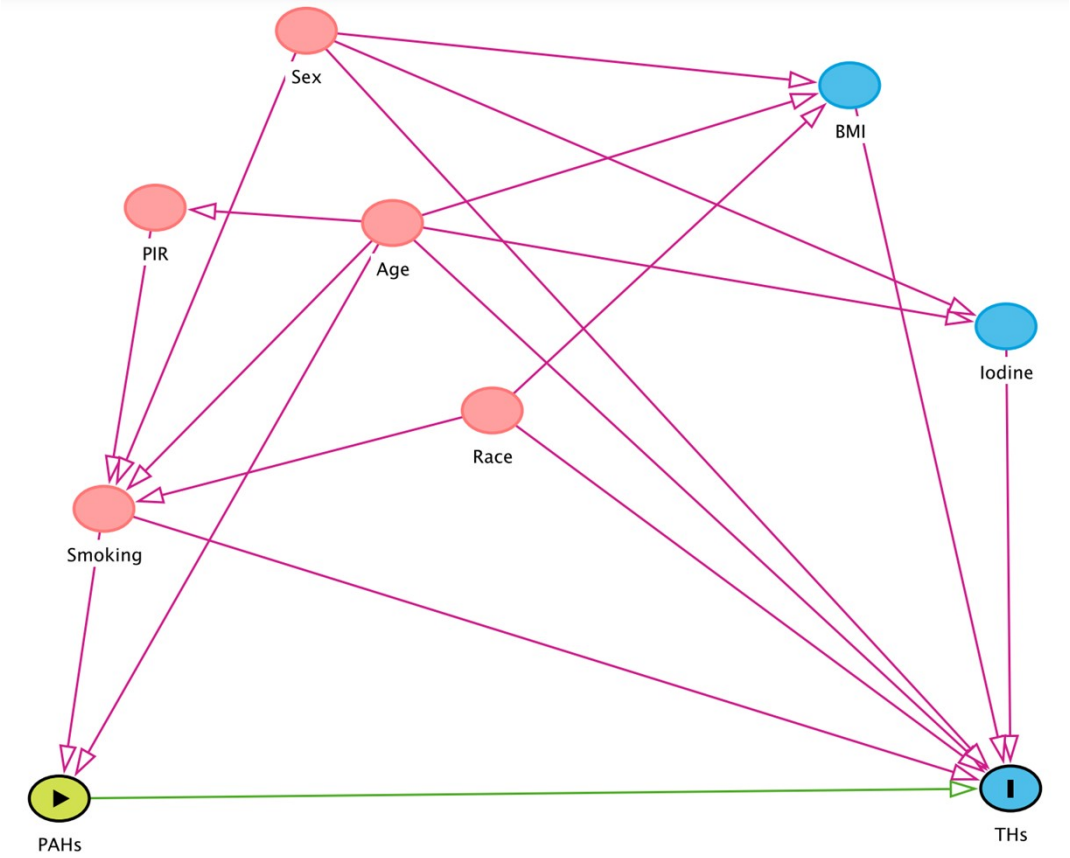

Figure S1. A directed acyclic graph (DAG), visualizing the assumed causal relationships between exposures, outcomes, and covariates, used to identify potential confounders (created with DAGitty: http://www.dagitty.net/dags.html).