Supplementary material

Fluorene exposure among PAH-exposed workers is associated with epigenetic markers related to lung cancer

Ayman Alhamdow^{1,†}, Yona J. Essig^{2,†}, Annette M. Krais², Per Gustavsson^{1,3}, Håkan Tinnerberg⁴, Christian Lindh², Jessika Hagberg^{5,6}, Pål Graff⁷, Maria Albin^{1,2,3}, Karin Broberg^{1,2,*}

1 Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden.

2 Division of Occupational and Environmental Medicine, Department of Laboratory Medicine, Lund University, Lund, Sweden.

3 Centre for Occupational and Environmental Medicine (CAMM), Region Stockholm, Stockholm, Sweden.

4 Section of Occupational and Environmental Medicine, Sahlgrenska Academy at University of Gothenburg, Gothenburg, Sweden.

5 MTM Research Centre, School of Science and Technology, Örebro University, Örebro, Sweden.

6 Department of Occupational and Environmental Medicine, Faculty of Medicine and Health, Örebro University, Örebro, Sweden.

7 National Institute of Occupational Health (STAMI), Oslo, Norway.

[†]These authors contributed equally to this work.

*To whom correspondence should be addressed: Karin Broberg Unit of Metals & Health Institute of Environmental Medicine Karolinska Institutet Nobels Väg 13 SE-171 77 Stockholm, Sweden Tel: +46 8 524 874 05 Fax: +46 8 33 69 81 Email: karin.broberg@ki.se

Group			1-OH-Pyr	2-OH-Phe	3-OH-BaP	3-ОН-ВаА	1-OH-Phe	∑2-,3- OH-Phe	4-OH-Phe	∑OH-Phe
		rs	0.444							∑OH-Phe
	2-OH-Phe	P value (2-tailed)	<0.001							
		п	127							
		<i>rs</i> -0.025 -0.038								
	3-OH-BaP	P value (2-tailed)	0.800	0.696						
		n	108	108						
		r _s	0.052	0.187	0.380					
	3-OH-BaA	P value (2-tailed)	0.572	0.040	< 0.001					
		п	121	121	108					
		rs	0.388	0.714	-0.038	0.101				
	1-OH-Phe	P value (2-tailed)	<0.001	< 0.001	0.695	0.270				
Controla		n	127	127	108	121	0.721 <0.001			
Controls		rs	0.444	0.957	0.017	0.206	0.721			
	∑2-,3-OH-Phe	P value (2-tailed)	<0.001	<0.001	0.863	0.023	<0.001 127			
	_	n	127	127	108	121				
		rs	0.138	0.497	0.033	3 0.251	0.404	0.538		
	4-OH-Phe	P value (2-tailed)	0.122	<0.001	0.733	0.005	<0.001	<0.001		
		п	127	127	108	121	127	127		
		rs	0.425	0.866	-0.017	0.177	0.944	0.890	0.541	
	∑OH-Phe	P value (2-tailed)	<0.001	< 0.001	0.865	0.052	<0.001	< 0.001	< 0.001	
		n	127	127	108	121	127	127	127	
		rs	0.324	0.658	-0.082	0.126	0.622	0.661	0.491	0.675
	∑OH-Flu	P value (2-tailed)	<0.001	< 0.001	0.401	0.169	<0.001	<0.001	<0.001	<0.001
	_	n	127	127	108	121	127	127	127	127
		rs	0.859							
	2-OH-Phe	P value (2-tailed)	tailed) <0.001							
		n	120							
Chimney		rs	0.769	0.678						
sweeps	3-OH-BaP	P value (2-tailed)	<0.001	<0.001						
_		n	111	111						
	2 OIL D. A	rs	0.853	0.779	0.789					
	э-Оп-БаА	P value (2-tailed)	<0.001	<0.001	<0.001					

Table S1. Intercorrelations between PAH metabolites (including high-molecular-weight metabolites measured in a previous study [Alhamdow at al. 2018]) evaluated by

 Spearman's correlations among former/never smoking chimney sweeps, controls, and creosote-exposed workers.

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		n	115	115	111					
		rs	0.828	0.905	0.614	0.733				
	1-OH-Phe	P value (2-tailed)	< 0.001	<0.001	<0.001	<0.001				
		n	120	120	111	115				
		rs	0.888	0.969	0.698	0.782	0.921			
	∑2-,3-OH-Phe	P value (2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001			
	_	n 120 120 111 115 120 rs 0.722 0.872 0.491 0.670 0.881 0.491	120	111	115	120				
			0.882							
	4-OH-Phe	P value (2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		n	120	120	111	115	120	120		
		r _s	0.874	0.961	0.668	0.774	0.969	0.986	0.908	
	∑OH-Phe	P value (2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
	_	n	120	120	111	115	120	120	120	
		rs	0.702	0.788	0.588	0.661	0.810	0.828	0.723	0.833
	∑OH-Flu	P value (2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	—	n	120	120	111	115	120	120	120	<0.001 120
		rs	0.707							
	2-OH-Phe	P value (2-tailed)	0.003							
		п	15							
		rs	-0.275	-0.200						
	3-OH-BaP	P value (2-tailed)	0.321	0.475						
		п	15	15						
		rs	0.479	0.418	-0.350					
	3-OH-BaA	P value (2-tailed)	0.071	0.121	0.201					
Crasseta		n	15	15	15					
creosole-		rs	0.532	0.554	-0.550	0.368				
workers	1-OH-Phe	P value (2-tailed)	0.041	0.032	0.034	0.177				
workers		n	15	15	15	15				
		rs	0.725	0.971	-0.196	0.421	0.546			
	∑2-,3-OH-Phe	P value (2-tailed)	0.002	<0.001	0.483	0.118	18 0.035			
		n	15	15	15	15	15			
		rs 0.482 0.754 -0.293 0.307 0.718	0.789							
	4-OH-Phe	P value (2-tailed)	0.069	0.001	0.289	0.265	0.003	<0.001		
		n	15	15	15	15	15	15		ļ
	$\Sigma \cap H_{-}Phe$	rs	0.686	0.861	-0.400	0.400	0.868	0.871	0.882	
Z		<i>P</i> value (2-tailed)	0.005	< 0.001	0.140	0.140	< 0.001	< 0.001	< 0.001	

	n	15	15	15	15	15	15	15	
	rs	0.718	0.650	-0.250	0.411	0.643	0.586	0.468	0.682
∑OH-Flu	P value (2-tailed)	0.003	0.009	0.369	0.128	0.010	0.022	0.079	0.005
_	n	15	15	15	15	15	15	15	15

Abbreviations: 1-OH-Pyr (1-hydroxypyrene), 2-OH-Phe (2- hydroxyphenanthrene), 3-OH-BaP (3-hydroxybenzo[a]pyrene), 3-OH-BaA (3-hydroxybenzo[a]anthracene), Σ 2-,3-OH-Phe (sum of 2- and 3-hydroxyphenanthrene), 4-OH-Phe (4-hydroxyphenanthrene), Σ OH-Phe (Sum of 1-, 2-, 3-, and 4-hydroxyphenanthrene), Σ OH-Flu (sum of 2- and 3-hydroxyphenanthrene).

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	Chimney sweeps (n=	=70)	Controls (n=83)		
	B (95% CI) ^{<i>a</i>}	Р	B (95% CI) ^a	Р	
Relative telomere length	0.0066 (-0.076, 0.090)	0.87	0.0073 (-0.20, 0.21)	0.94	
Relative mtDNAcn	0.021 (-0.094, 0.14)	0.72	-0.046 (-0.35, 0.26)	0.77	
F2RL3_CpG1	-0.75 (-3.4, 1.9)	0.58	-4.0 (-11, 3.0)	0.26	
F2RL3_CpG2 (cg03636183)	0.43 (-1.9, 2.7)	0.71	-1.7 (-7.0, 3.7)	0.54	
AHRR_CpG1	-1.8 (-6.4, 2.7)	0.42	-1.6 (-13, 10.1)	0.78	
AHRR_CpG2	-4.1 (-8.0, -0.16)	0.042	4.8 (-4.6, 14.3)	0.31	
AHRR CpG3 (cg05575921)	-4.3 (-9.7, 1.1)	0.11	-1.4 (-11, 8.1)	0.77	

Table S2. Linear regression analyses for the associations between urinary concentrations of \sum OH-fluorene (sum of 2- and 3-OH fluorene: $\mu g/g$ creatinine) and cancer biomarkers among never smoking chimney sweeps and controls adjusting for age [B=unstandardised beta estimate, 95%CI= 95% confidence interval].

^{*a*}Outcome (DNA methylation) = intercept + $B_{\bullet}(\Sigma OH-fluorene) + B1.(age)$

Table S3. Linear regression analyses for the association between urinary concentrations of PAH metabolites and cancer biomarkers among chimney sweeps and creosote-exposed workers [B=unstandardised beta estimate, 95%CI= 95% confidence interval].

B (95% CI) P B (95% CI) P Chimney sweeps $n=143^{\circ}$ $n=142^{\circ}$ I-OH-Phe (µg/g crea.) $n=162^{\circ}$ Relative telomere length Relative telomere length 0.0090 (-0.055, 0.072) 0.79 0.022 (-0.038, 0.081) 0.47 Relative telomere length (µg/g crea.) 0.0090 (-0.055, 0.072) 0.79 0.022 (-0.038, 0.081) 0.47 Relative telomere length (µg/g crea.) 0.090 (-0.12, 0.091) 0.81 -0.0048 (-0.11, 0.10) 0.93 P2RL3_CpG2 0.090 (-3.7, 3.9) 0.96 0.17 (-2.7, 3.1) 0.91 (µg/g crea.) Relative telomere length 0.0070 (-0.022, 0.035) 0.65 0.013 (-0.013, 0.039) 0.33 Relative telomere length 0.0070 (-0.022, 0.035) 0.65 0.013 (-0.013, 0.039) 0.33 Relative telomere length 0.0070 (-0.022, 0.035) 0.65 0.013 (-0.013, 0.039) 0.33 Relative telomere length 0.0070 (-0.022, 0.035) 0.65 0.013 (-0.013, 0.039) 0.33 Relative telomere length 0.0070 (-0.022, 0.035) 0.65 0.0013 (-0.013, 0.039) 0.33 <		Model 1 (unadjusted)		Model 2 (age- and smoking-adjusted)		
Chinney sweeps $n=143^{*}$ $n=142^{*}$ 1-OH-Phe (gr/g crea.) 0.0090 (-0.055, 0.072) 0.79 0.022 (-0.038, 0.081) 0.47 Relative telomere length 0.0090 (-3.7, 3.9) 0.96 0.17 (-2.7, 3.1) 0.91 $2RL3_CpG1$ -1.9 (-6.1, 2.2) 0.36 -1.6 (-4.9, 1.7) 0.33 $2RL3_CpG2$ 0.090 (-3.7, 3.9) 0.96 0.17 (-2.7, 3.1) 0.91 ($cg03530183$) 0.094 (-6.2, 8.0) 0.79 1.9 (-3.2, 6.9) 0.46 $AHRR_CpG3$ 0.60 (-8.8, 10) 0.90 1.9 (-4.3, 8.0) 0.55 $cg03537921$) 0.600 (-0.022, 0.035) 0.65 0.013 (-0.013, 0.039) 0.33 Relative telomere length 0.0070 (-0.022, 0.035) 0.65 0.013 (-0.013, 0.042) 0.86 $cg03536183$ -0.17 (-1.9, 1.6) 0.85 -0.06 (-1.3, 1.2) 0.93 $AHRR_CpG1$ -1.2 (-3.1, 0.67) 0.21 -0.96 (-2.4, 0.50) 0.20 $cg03536183$ -0.017 (-1.9, 1.6) 0.85 -0.066 (-1.3, 1.2) 0.93 $AHRR_CpG3$ -0.011 (-1.9, 1.6) 0		B (95% CI)	Р	B (95% CI)	Р	
1-OH-Phe (µg/g crea.)	Chimney sweeps	<i>n</i> =143*		<i>n</i> =142*		
$\begin{array}{c $	1-OH-Phe					
Relative terbinere length 0.0007 (-0.053, 0.072) 0.79 0.022 (-0.058, 0.081) 0.47 Relative terbinere length 0.0013 (-0.12, 0.091) 0.81 -0.0014 (-0.13, 0.012) 0.93 F2RL3_CpG2 0.090 (-3.7, 3.9) 0.96 0.17 (-2.7, 3.1) 0.91 (gg03636133) 0.090 (-3.7, 3.9) 0.96 0.17 (-2.7, 3.1) 0.91 AHRR_CpG2 0.94 (-6.2, 8.0) 0.79 1.9 (-3.2, 6.9) 0.46 AHRR_CpG3 0.60 (-8.8, 10) 0.90 1.9 (-4.3, 8.0) 0.55 Z2-3.0H-Phe	$(\mu g/g \text{ crea.})$	0.0000 (0.055, 0.072)	0.70	0.022 (0.028, 0.081)	0.47	
Relative miDNAcin -0.013 (0.12, 0.01) 0.81 -0.0046 (0.11, 0.10) 0.93 $F2RL3_CpG2$ 0.900 (-3.7, 3.9) 0.96 0.17 (-2.7, 3.1) 0.91 (cg03636183) 0.904 (-6.2, 8.0) 0.79 1.9 (-3.2, 6.9) 0.46 $AHRR_CpG2$ 0.94 (-6.2, 8.0) 0.79 1.9 (-3.2, 6.9) 0.46 $AHRR_CpG3$ 0.60 (-8.8, 10) 0.90 1.9 (-4.3, 8.0) 0.55 $\Sigma_{2.3}$ -OH-Phe (ug/g crea.) Relative telomere length 0.0070 (-0.022, 0.035) 0.65 0.013 (-0.013, 0.039) 0.33 Relative miDNAcin -0.0092 (-0.056, 0.037) 0.70 -0.0042 (-0.051, 0.042) 0.86 $72RL3_CpG2$ -0.17 (-1.9, 1.6) 0.85 -0.06 (-1.3, 1.2) 0.93 $AHRR_CpG3$ -0.017 (-1.9, 1.6) 0.85 -0.06 (-1.3, 1.2) 0.93 $AHRR_CpG1$ -0.66 (-2.7, 4.0) 0.70 1.1 (-1.4, 3.6) 0.39 $AHRR_CpG3$ -0.0011 (-4.38, 0.015) 0.40 -0.00021 (-0.0020, 0.0062) 0.32 Relative telomere length 0.000079 (-0.00036, 0.00052) 0.72 0.00021 (Relative telomere length	0.0090 (-0.055, 0.072)	0.79	0.022 (-0.038, 0.081)	0.47	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	FORL 2 CrC1	-0.013(-0.12, 0.091)	0.81	-0.0048 (-0.11, 0.10)	0.93	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	F_2RL_3 _CpG1	-1.9 (-0.1, 2.2)	0.30	-1.0 (-4.9, 1.7)	0.35	
AHRR_CpG1 $1.9.(-5.6, 9.4)$ 0.61 $2.7.(-3.0, 8.3)$ 0.36 AHRR_CpG2 $0.94(-6.2, 8.0)$ 0.79 $1.9.(-3.2, 6.9)$ 0.46 AHRR_CpG3 $0.60(-8.8, 10)$ 0.90 $1.9.(-3.2, 6.9)$ 0.46 $2.7.3-OH-Phe$ $(\mu g'g crea.)$ π	(cg03636183)	0.090 (-3.7, 3.9)	0.96	0.17 (-2.7, 3.1)	0.91	
AHRR_CpG2 $0.94 (-6.2, 8.0)$ 0.79 $1.9 (-3.2, 6.9)$ 0.46 AHRR_CpG3 $0.60 (-8.8, 10)$ 0.90 $1.9 (-4.3, 8.0)$ 0.55 Σ_2 -3-OH-Phe ($gg/575921$) $0.0070 (-0.022, 0.035)$ 0.65 $0.013 (-0.013, 0.039)$ 0.33 Relative telomere length $0.0070 (-0.022, 0.035)$ 0.65 $0.013 (-0.013, 0.039)$ 0.33 Relative telomere length $0.0070 (-0.022, 0.035)$ 0.65 $0.014 (-0.051, 0.042)$ 0.86 <i>F2RL3_CPG1</i> $-1.2 (-3.1, 0.67)$ 0.21 $-0.96 (-2.4, 0.50)$ 0.20 (cg03636183) $-0.017 (-1.9, 1.6)$ 0.85 $-0.06 (-1.3, 1.2)$ 0.93 AHRR_CPG2 $0.33 (-2.9, 3.5)$ 0.84 $0.77 (-1.5, 3.0)$ 0.50 AHRR_CPG3 $-0.041 (-4.3, 4.2)$ 0.98 $0.58 (-2.2, 3.3)$ 0.67 (rg/g crea.) Relative telomere length $0.00020 (-0.00051, 0.00052)$ 0.72 $0.00021 (-0.00024, 0.0010)$ 0.32 F2RL3_CPG1 $-0.022 (-0.050, 0.0068)$ 0.14 $-0.011 (-0.034, 0.011)$ 0.32 Cg2RL3_CPG2	AHRR_CpG1	1.9 (-5.6, 9.4)	0.61	2.7 (-3.0, 8.3)	0.36	
AHRR_CpG3 (cg05575921) $0.60 (-8.8, 10)$ 0.90 $1.9 (-4.3, 8.0)$ 0.55 S2-3-OH-Phe (ug/g crea.) v v Relative telomere length $0.0070 (-0.022, 0.035)$ 0.65 $0.013 (-0.013, 0.039)$ 0.33 Relative mtDNAcn $-0.0092 (-0.056, 0.037)$ 0.70 $-0.0042 (-0.051, 0.042)$ 0.86 <i>F2RL3_CpG1</i> $-1.2 (-3.1, 0.67)$ 0.21 $-0.96 (-2.4, 0.50)$ 0.20 <i>F2RL3_CpG2</i> $0.17 (-1.9, 1.6)$ 0.85 $-0.006 (-1.3, 1.2)$ 0.93 AHRR_CpG1 $0.66 (-2.7, 4.0)$ 0.70 $1.1 (-1.4, 3.6)$ 0.39 AHRR_CpG3 $-0.041 (-4.3, 4.2)$ 0.98 $0.58 (-2.2, 3.3)$ 0.67 (cg05575921) $-0.041 (-4.3, 4.2)$ 0.98 $0.58 (-2.2, 3.3)$ 0.67 Relative telomere length $0.000079 (-0.00036, 0.00052)$ 0.72 $0.00021 (-0.00020, 0.00062)$ 0.32 Relative telomere length $0.00020 (-0.00051, 0.00090)$ 0.58 $0.00029 (-0.00042, 0.010)$ 0.43 <i>F2RL3_CpG2</i> $-0.011 (-0.038, 0.015)$ 0.40 $-0.00042, 0.01$	AHRR_CpG2	0.94 (-6.2, 8.0)	0.79	1.9 (-3.2, 6.9)	0.46	
$\begin{array}{ c c c c c c c c c c c c c c c c c c $	AHRR_CpG3 (cg05575921)	0.60 (-8.8, 10)	0.90	1.9 (-4.3, 8.0)	0.55	
(µg/g crea.) $0.0070 (-0.022, 0.035)$ 0.65 $0.013 (-0.013, 0.039)$ 0.33 Relative telomere length $0.0070 (-0.022, 0.035)$ 0.70 $-0.0042 (-0.051, 0.042)$ 0.86 F2RL3_CpG1 $-1.2 (-3.1, 0.67)$ 0.21 $-0.96 (-2.4, 0.50)$ 0.20 F2RL3_CpG2 $-0.17 (-1.9, 1.6)$ 0.85 $-0.06 (-1.3, 1.2)$ 0.93 AHRR_CpG1 $0.66 (-2.7, 4.0)$ 0.70 $1.1 (-1.4, 3.6)$ 0.39 AHRR_CpG2 $0.33 (-2.9, 3.5)$ 0.84 $0.77 (-1.5, 3.0)$ 0.50 AHRC_pG3 $-0.041 (-4.3, 4.2)$ 0.98 $0.58 (-2.2, 3.3)$ 0.67 (rg0 grea.) Relative telomere length $0.000079 (-0.00036, 0.00052)$ 0.72 $0.00029 (-0.00042, 0.0010)$ 0.32 Relative telomere length $0.000020 (-0.00051, 0.00090)$ 0.58 $0.00029 (-0.0042, 0.0100)$ 0.32 Relative mtDNAcn $0.0022 (-0.050, 0.0068)$ 0.14 $-0.011 (-0.034, 0.011)$ 0.32 F2RL3_CpG1 $-0.022 (-0.050, 0.0068)$ 0.14 $-0.010 (-0.024, 0.016)$ 0.69 (rg0 3536183) </td <td>∑2-,3-OH-Phe</td> <td></td> <td></td> <td></td> <td></td>	∑2-,3-OH-Phe					
Relative telomere length $0.0070(-0.022, 0.035)$ 0.65 $0.013(-0.013, 0.039)$ 0.33 Relative mtDNAcn $-0.0092(-0.056, 0.037)$ 0.70 $-0.0042(-0.051, 0.042)$ 0.86 <i>F2RL3_CpG1</i> $-1.2(-3.1, 0.67)$ 0.21 $-0.96(-2.4, 0.50)$ 0.20 <i>F2RL3_CpG2</i> $-0.17(-1.9, 1.6)$ 0.85 $-0.06(-1.3, 1.2)$ 0.93 <i>AHRR_CpG1</i> $0.66(-2.7, 4.0)$ 0.70 $1.1(-1.4, 3.6)$ 0.39 <i>AHRR_CpG2</i> $0.33(-2.9, 3.5)$ 0.84 $0.77(-1.5, 3.0)$ 0.50 <i>AHRR_CpG3</i> $-0.041(-4.3, 4.2)$ 0.98 $0.58(-2.2, 3.3)$ 0.67 (cg05575921) $-0.041(-4.3, 4.2)$ 0.98 $0.00029(-0.00020, 0.00062)$ 0.32 Relative telomere length $0.000029(-0.00036, 0.00052)$ 0.72 $0.00021(-0.00020, 0.00062)$ 0.32 Relative mtDNAcn $0.00022(-0.050, 0.0068)$ 0.14 $-0.011(-0.034, 0.011)$ 0.32 <i>F2RL3_CpG2</i> $-0.011(-0.038, 0.015)$ 0.40 $-0.0040(-0.024, 0.016)$ 0.69 (cg03636183) $-0.011(-0.038, 0.035)$ 0.56 $0.0051(-0.030, 0.040)$ 0.77	(µg/g crea.)		0.65	0.010 / 0.010 0.000	0.00	
Relative mUDNACE $-0.0092 (-0.005, 0.057)$ 0.70 $-0.0042 (-0.051, 0.042)$ 0.86 <i>F2RL3</i> _CpG2 $-0.17 (-1.9, 1.6)$ 0.21 $-0.096 (-2.4, 0.50)$ 0.20 (cg03636183) $-0.17 (-1.9, 1.6)$ 0.85 $-0.06 (-1.3, 1.2)$ 0.93 <i>AHRR_CpG2</i> $0.33 (-2.9, 3.5)$ 0.84 $0.77 (-1.5, 3.0)$ 0.50 <i>AHRR_CpG3</i> $-0.041 (-4.3, 4.2)$ 0.98 $0.58 (-2.2, 3.3)$ 0.67 (cg05575921) $-0.041 (-4.3, 4.2)$ 0.98 $0.58 (-2.2, 3.3)$ 0.67 AUHPhe (ng/g crea.) $real real rea real rea $	Relative telomere length	0.0070 (-0.022, 0.035)	0.65	0.013 (-0.013, 0.039)	0.33	
$F_{2RL3}_CpG1 = -1.2 (-5.1, 0.67) = 0.21 = -0.96 (-2.4, 0.50) = 0.20 = 0.21 = 0.96 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.20 = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.50) = 0.21 (-2.4, 0.51) = 0.21 (-2.$	Relative mtDNAcn	-0.0092 (-0.056, 0.037)	0.70	-0.0042 (-0.051, 0.042)	0.86	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	F2RL3_CpG1	-1.2 (-3.1, 0.67)	0.21	-0.96 (-2.4, 0.50)	0.20	
AHRR_CpG1 $0.66 (-2.7, 4.0)$ 0.70 $1.1 (-1.4, 3.6)$ 0.39 AHRR_CpG2 $0.33 (-2.9, 3.5)$ 0.84 $0.77 (-1.5, 3.0)$ 0.50 AHRR_CpG3 $-0.041 (-4.3, 4.2)$ 0.98 $0.58 (-2.2, 3.3)$ 0.67 AOH-Phe $(ng/g crea.)$ $-0.041 (-4.3, 4.2)$ 0.98 $0.58 (-2.2, 3.3)$ 0.67 Relative telomere length $0.000079 (-0.00036, 0.00052)$ 0.72 $0.00021 (-0.00020, 0.00062)$ 0.32 Relative telomere length $0.00020 (-0.00051, 0.00090)$ 0.58 $0.00029 (-0.00042, 0.0010)$ 0.43 F2RL3_CpG1 $-0.022 (-0.050, 0.0068)$ 0.14 $-0.011 (-0.034, 0.011)$ 0.32 Geg03636183) $-0.011 (-0.038, 0.015)$ 0.40 $-0.0040 (-0.024, 0.016)$ 0.69 AHRR_CpG2 $-0.014 (-0.063, 0.035)$ 0.56 $0.0051 (-0.030, 0.040)$ 0.77 AHRR_CpG3 $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 CpG1 $-0.090 (-0.015, 0.023)$ 0.69 $0.0084 (-0.096, 0.026)$ 0.36 Relative telomere length $0.0040 (-0.015, 0.023)$ 0.69 $0.0005 (-0.036, 0.026)$	F2RL3_CpG2 (cg03636183)	-0.17 (-1.9, 1.6)	0.85	-0.06 (-1.3, 1.2)	0.93	
AHRR_CpG2 $0.33(-2.9, 3.5)$ 0.84 $0.77(-1.5, 3.0)$ 0.50 AHRR_CpG3 $-0.041(-4.3, 4.2)$ 0.98 $0.58(-2.2, 3.3)$ 0.67 A+OH-Phe mg/g crea.) mg/g crea.) mg/g crea.) mg/g crea.) mg/g crea.) Relative telomere length $0.000079(-0.00036, 0.00052)$ 0.72 $0.00021(-0.00020, 0.00062)$ 0.32 Relative mtDNAcn $0.00020(-0.00051, 0.00090)$ 0.58 $0.00029(-0.00042, 0.0010)$ 0.43 F2RL3_CpG1 $-0.022(-0.050, 0.0068)$ 0.14 $-0.011(-0.034, 0.011)$ 0.32 Cg03636183) $-0.011(-0.038, 0.015)$ 0.40 $-0.0040(-0.024, 0.016)$ 0.69 AHRR_CpG2 $-0.014(-0.063, 0.035)$ 0.56 $0.0051(-0.030, 0.040)$ 0.77 AHRR_CpG3 $-0.022(-0.087, 0.042)$ 0.49 $0.0053(-0.037, 0.048)$ 0.81 COH-Phe mg/g crea.) </td <td>AHRR CpG1</td> <td>0.66 (-2.7, 4.0)</td> <td>0.70</td> <td>1.1 (-1.4, 3.6)</td> <td>0.39</td>	AHRR CpG1	0.66 (-2.7, 4.0)	0.70	1.1 (-1.4, 3.6)	0.39	
AHRR_CpG3 (cg05575921) $-0.041(-4.3, 4.2)$ 0.98 $0.58(-2.2, 3.3)$ 0.67 4-OH-Phe (ng/g crea.) $-0.041(-4.3, 4.2)$ 0.98 $0.58(-2.2, 3.3)$ 0.67 Relative telomere length $0.000079(-0.00036, 0.00052)$ 0.72 $0.00021(-0.00020, 0.00062)$ 0.32 Relative mtDNAcn $0.00020(-0.00051, 0.00090)$ 0.58 $0.00029(-0.00042, 0.0010)$ 0.43 F2RL3_CpG1 $-0.022(-0.050, 0.0068)$ 0.14 $-0.011(-0.034, 0.011)$ 0.32 F2RL3_CpG2 $-0.011(-0.038, 0.015)$ 0.40 $-0.0040(-0.024, 0.016)$ 0.69 AHRR_CpG1 $-0.0090(-0.061, 0.043)$ 0.73 $0.010(-0.029, 0.049)$ 0.61 AHRR_CpG2 $-0.014(-0.063, 0.035)$ 0.56 $0.0051(-0.030, 0.040)$ 0.77 AHRR_CpG3 $-0.022(-0.087, 0.042)$ 0.49 $0.0053(-0.037, 0.048)$ 0.81 CoH-Phe $(gg05575921)$ $-0.025(-0.036, 0.026)$ 0.75 $-0.0018(-0.034, 0.030)$ 0.91 Cycle $-0.0050(-0.036, 0.026)$ 0.75 $-0.0018(-0.034, 0.030)$ 0.91 F2RL3_CpG1 $-0.77(-2.0, 0.49)$ 0.23 $-0.61(-1.6, 0.38)$	AHRR CpG2	0.33 (-2.9, 3.5)	0.84	0.77 (-1.5, 3.0)	0.50	
(cg05575921)-0.041 (-4.3, 4.2)0.980.58 (-2.2, 3.3)0.67 4-OH-Phe (ng/g crea.)	AHRR CpG3		0.00		0.77	
4-OH-Phe (ng/g crea.) Image: state st	(cg05575921)	-0.041 (-4.3, 4.2)	0.98	0.58 (-2.2, 3.3)	0.67	
(ng/g crea.) $(mg/g crea.)$ $(mg/g crea.)$ Relative telomere length0.000079 (-0.00036, 0.00052)0.720.00021 (-0.00020, 0.00062)0.32Relative mtDNAcn0.00020 (-0.00051, 0.00090)0.580.00029 (-0.00042, 0.0010)0.43F2RL3_CpG1-0.022 (-0.050, 0.0068)0.14-0.011 (-0.034, 0.011)0.32F2RL3_CpG2-0.011 (-0.038, 0.015)0.40-0.0040 (-0.024, 0.016)0.69(cg03636183)-0.0090 (-0.061, 0.043)0.730.010 (-0.029, 0.049)0.61AHRR_CpG2-0.014 (-0.063, 0.035)0.560.0051 (-0.030, 0.040)0.77AHRR_CpG3-0.022 (-0.087, 0.042)0.490.0053 (-0.037, 0.048)0.81 Σ OH-Phe(µg/g crea.)0.0050 (-0.036, 0.026)0.75-0.0018 (-0.034, 0.030)0.91F2RL3_CpG1-0.077 (-2.0, 0.49)0.23-0.61 (-1.6, 0.38)0.23F2RL3_CpG2-0.089 (-1.3, 1.1)0.88-0.020 (-0.89, 0.85)0.96(cg03536183)-0.021 (-2.0, 2.4)0.850.54 (-1.0, 2.1)0.49AHRR_CpG30.21 (-2.0, 2.8)1.00.45 (-1.4, 2.3)0.63	4-OH-Phe					
Relative telomere length $0.00079 (-0.00036, 0.00052)$ 0.72 $0.00021 (-0.00020, 0.00062)$ 0.32 Relative mtDNAcn $0.00020 (-0.00051, 0.00090)$ 0.58 $0.00029 (-0.00042, 0.0010)$ 0.43 <i>F2RL3_CpG1</i> $-0.022 (-0.050, 0.0068)$ 0.14 $-0.011 (-0.034, 0.011)$ 0.32 <i>F2RL3_CpG2</i> $-0.011 (-0.038, 0.015)$ 0.40 $-0.0040 (-0.024, 0.016)$ 0.69 <i>AHRR_CpG1</i> $-0.0090 (-0.061, 0.043)$ 0.73 $0.010 (-0.029, 0.049)$ 0.61 <i>AHRR_CpG2</i> $-0.014 (-0.063, 0.035)$ 0.56 $0.0051 (-0.030, 0.040)$ 0.77 <i>AHRR_CpG3</i> $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 $\sum OH-Phe$ $(\mu g/g crea.)$ $0.0040 (-0.015, 0.023)$ 0.69 $0.0084 (-0.0096, 0.026)$ 0.36 Relative telomere length $0.0040 (-0.015, 0.023)$ 0.69 $0.0014 (-0.034, 0.030)$ 0.91 <i>F2RL3_CpG2</i> $-0.077 (-2.0, 0.49)$ 0.23 $-0.61 (-1.6, 0.38)$ 0.23 <i>F2RL3_CpG2</i> $-0.089 (-1.3, 1.1)$ 0.88 $-0.020 (-0.89, 0.85)$ 0.96 <i>AHRR_CpG1</i> $0.46 (-1.8, 2.8)$ 0.69 $0.77 (-0.95, 2.5)$ 0.38 <i>AHRR_CpG2</i> $0.21 (-2.0, 2.4)$ 0.85 $0.54 (-1.0, 2.1)$ 0.49 <i>AHRR_CpG3</i> $-0.0068 (-2.9, 2.8)$ 1.0 $0.45 (-1.4, 2.3)$ 0.63	(ng/g crea.)					
Relative mtDNAcn $0.00020 (-0.00051, 0.00090)$ 0.58 $0.00029 (-0.00042, 0.0010)$ 0.43 <i>F2RL3_CpG1</i> $-0.022 (-0.050, 0.0068)$ 0.14 $-0.011 (-0.034, 0.011)$ 0.32 <i>F2RL3_CpG2</i> $-0.011 (-0.038, 0.015)$ 0.40 $-0.0040 (-0.024, 0.016)$ 0.69 <i>AHRR_CpG1</i> $-0.0090 (-0.061, 0.043)$ 0.73 $0.010 (-0.029, 0.049)$ 0.61 <i>AHRR_CpG2</i> $-0.014 (-0.063, 0.035)$ 0.56 $0.0051 (-0.030, 0.040)$ 0.77 <i>AHRR_CpG3</i> $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 <i>Coll Phe</i> $-0.0050 (-0.036, 0.026)$ 0.75 $-0.0018 (-0.096, 0.026)$ 0.36 Relative telomere length $0.0040 (-0.015, 0.023)$ 0.69 $0.0084 (-0.0096, 0.026)$ 0.36 <i>F2RL3_CpG1</i> $-0.77 (-2.0, 0.49)$ 0.23 $-0.61 (-1.6, 0.38)$ 0.23 <i>F2RL3_CpG2</i> $-0.089 (-1.3, 1.1)$ 0.88 $-0.020 (-0.89, 0.85)$ 0.96 <i>AHRR_CpG2</i> $0.21 (-2.0, 2.4)$ 0.85 $0.54 (-1.0, 2.1)$ 0.49 <i>AHRR_CpG3</i> $-0.0068 (-2.9, 2.8)$ 1.0 $0.45 (-1.4, 2.3)$ 0.63 <i>Creosote-exposed</i> $n=19$ $n=18$ $n=18$	Relative telomere length	0.000079 (-0.00036, 0.00052)	0.72	0.00021 (-0.00020, 0.00062)	0.32	
$F2RL3_CpGI$ $-0.022 (-0.050, 0.0068)$ 0.14 $-0.011 (-0.034, 0.011)$ 0.32 $F2RL3_CpG2$ $-0.011 (-0.038, 0.015)$ 0.40 $-0.0040 (-0.024, 0.016)$ 0.69 $AHRR_CpG1$ $-0.0090 (-0.061, 0.043)$ 0.73 $0.010 (-0.029, 0.049)$ 0.61 $AHRR_CpG2$ $-0.014 (-0.063, 0.035)$ 0.56 $0.0051 (-0.030, 0.040)$ 0.77 $AHRR_CpG3$ $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 Σ OH-Phe $-0.026 (-0.036, 0.026)$ 0.75 $-0.0018 (-0.034, 0.030)$ 0.91 $Relative telomere length$ $0.0040 (-0.015, 0.023)$ 0.69 $0.0084 (-0.0096, 0.026)$ 0.36 Relative telomere length $0.0040 (-0.015, 0.023)$ 0.69 $0.0084 (-0.0096, 0.026)$ 0.32 $F2RL3_CpG1$ $-0.77 (-2.0, 0.49)$ 0.23 $-0.61 (-1.6, 0.38)$ 0.23 $F2RL3_CpG2$ $-0.089 (-1.3, 1.1)$ 0.88 $-0.020 (-0.89, 0.85)$ 0.96 $G(203636183)$ $-0.068 (-1.8, 2.8)$ 0.69 $0.77 (-0.95, 2.5)$ 0.38 $AHRR_CpG2$ $0.21 (-2.0, 2.4)$ 0.85 $0.54 (-1.0, 2.1)$ 0.49	Relative mtDNAcn	0.00020 (-0.00051, 0.00090)	0.58	0.00029 (-0.00042, 0.0010)	0.43	
$F2RL3_CpG2$ -0.011 (-0.038, 0.015) 0.40 -0.0040 (-0.024, 0.016) 0.69 $AHRR_CpG1$ -0.0090 (-0.061, 0.043) 0.73 0.010 (-0.029, 0.049) 0.61 $AHRR_CpG2$ -0.014 (-0.063, 0.035) 0.56 0.0051 (-0.030, 0.040) 0.77 $AHRR_CpG3$ -0.022 (-0.087, 0.042) 0.49 0.0053 (-0.037, 0.048) 0.81 Σ OH-Phe (µg/g crea.)	F2RL3 CpG1	-0.022 (-0.050, 0.0068)	0.14	-0.011 (-0.034, 0.011)	0.32	
AHRR_CpG1-0.0090 (-0.061, 0.043)0.730.010 (-0.029, 0.049)0.61 $AHRR_CpG2$ -0.014 (-0.063, 0.035)0.560.0051 (-0.030, 0.040)0.77 $AHRR_CpG3$ (cg05575921)-0.022 (-0.087, 0.042)0.490.0053 (-0.037, 0.048)0.81 Σ OH-Phe (µg/g crea.)-0.022 (-0.087, 0.042)0.490.0053 (-0.037, 0.048)0.81 Σ OH-Phe (µg/g crea.)-0.0040 (-0.015, 0.023)0.690.0084 (-0.0096, 0.026)0.36Relative telomere length0.0040 (-0.015, 0.023)0.690.0084 (-0.0096, 0.026)0.36Relative mtDNAcn-0.0050 (-0.036, 0.026)0.75-0.0018 (-0.034, 0.030)0.91 $F2RL3_CpG1$ -0.77 (-2.0, 0.49)0.23-0.61 (-1.6, 0.38)0.23 $F2RL3_CpG2$ -0.089 (-1.3, 1.1)0.88-0.020 (-0.89, 0.85)0.96(cg03636183)0.46 (-1.8, 2.8)0.690.77 (-0.95, 2.5)0.38 $AHRR_CpG2$ 0.21 (-2.0, 2.4)0.850.54 (-1.0, 2.1)0.49 $AHRR_CpG3$ (cg05575921)-0.0068 (-2.9, 2.8)1.00.45 (-1.4, 2.3)0.63 r=19r=18r=18r=18	$F2RL3_CpG2$	-0.011 (-0.038, 0.015)	0.40	-0.0040 (-0.024, 0.016)	0.69	
AHRR_CpG2 $-0.0550 (-0.001, 0.043)$ 0.73 $0.010 (-0.029, 0.049)$ 0.011 AHRR_CpG2 $-0.014 (-0.063, 0.035)$ 0.56 $0.0051 (-0.030, 0.040)$ 0.77 AHRR_CpG3 (cg05575921) $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 Σ OH-Phe (µg/g crea.) $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 Relative telomere length $0.0040 (-0.015, 0.023)$ 0.69 $0.0084 (-0.0096, 0.026)$ 0.36 Relative mtDNAcn $-0.0050 (-0.036, 0.026)$ 0.75 $-0.0018 (-0.034, 0.030)$ 0.91 F2RL3_CpG1 $-0.77 (-2.0, 0.49)$ 0.23 $-0.61 (-1.6, 0.38)$ 0.23 F2RL3_CpG2 $-0.089 (-1.3, 1.1)$ 0.88 $-0.020 (-0.89, 0.85)$ 0.96 (cg03636183) $0.46 (-1.8, 2.8)$ 0.69 $0.77 (-0.95, 2.5)$ 0.38 AHRR_CpG1 $0.46 (-1.8, 2.8)$ 0.69 $0.77 (-0.95, 2.5)$ 0.38 AHRR_CpG3 $-0.0068 (-2.9, 2.8)$ 1.0 $0.45 (-1.4, 2.3)$ 0.63 (cg05575921) $-0.0068 (-2.9, 2.8)$ 1.0 $0.45 (-1.4, 2.3)$ 0.63	AHRR CnG1	-0.0000(0.061,0.043)	0.73	0.010 (0.020, 0.040)	0.61	
AHR_CpG2 $-0.014 (-0.003, 0.033)$ 0.36 $0.0051 (-0.030, 0.040)$ 0.77 $AHRR_CpG3$ (cg05575921) $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 Σ OH-Phe (µg/g crea.) $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 Relative telomere length $0.0040 (-0.015, 0.023)$ 0.69 $0.0084 (-0.0096, 0.026)$ 0.36 Relative mtDNAcn $-0.0050 (-0.036, 0.026)$ 0.75 $-0.0018 (-0.034, 0.030)$ 0.91 $F2RL3_CpG1$ $-0.77 (-2.0, 0.49)$ 0.23 $-0.61 (-1.6, 0.38)$ 0.23 $F2RL3_CpG2$ (cg03636183) $-0.089 (-1.3, 1.1)$ 0.88 $-0.020 (-0.89, 0.85)$ 0.96 $AHRR_CpG1$ $0.46 (-1.8, 2.8)$ 0.69 $0.77 (-0.95, 2.5)$ 0.38 $AHRR_CpG3$ (cg05575921) $-0.0068 (-2.9, 2.8)$ 1.0 $0.45 (-1.4, 2.3)$ 0.63 $r=19$ $r=18$ $r=18$ $r=18$ $r=18$	AHRR CnC2	-0.0050 (-0.001, 0.045)	0.75	0.010(-0.023, 0.043)	0.01	
AHRR_CPOS (cg05575921) $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 Σ OH-Phe (µg/g crea.) $-0.022 (-0.087, 0.042)$ 0.49 $0.0053 (-0.037, 0.048)$ 0.81 Relative telomere length $0.0040 (-0.015, 0.023)$ 0.69 $0.0084 (-0.0096, 0.026)$ 0.36 Relative mtDNAcn $-0.0050 (-0.036, 0.026)$ 0.75 $-0.0018 (-0.034, 0.030)$ 0.91 $F2RL3_CpG1$ $-0.77 (-2.0, 0.49)$ 0.23 $-0.61 (-1.6, 0.38)$ 0.23 $F2RL3_CpG2$ (cg03636183) $-0.089 (-1.3, 1.1)$ 0.88 $-0.020 (-0.89, 0.85)$ 0.96 AHRR_CpG1 $0.46 (-1.8, 2.8)$ 0.69 $0.77 (-0.95, 2.5)$ 0.38 AHRR_CpG3 (cg05575921) $-0.0068 (-2.9, 2.8)$ 1.0 $0.45 (-1.4, 2.3)$ 0.63 u=19	$\frac{1}{1000} C_{\rm P}C^2$	-0.014 (-0.063, 0.035)	0.36	0.0031 (-0.030, 0.040)	0.77	
Σ OH-Phe (µg/g crea.)0.0040 (-0.015, 0.023)0.690.0084 (-0.0096, 0.026)0.36Relative telomere length0.0040 (-0.015, 0.023)0.690.0084 (-0.0096, 0.026)0.36Relative mtDNAcn-0.0050 (-0.036, 0.026)0.75-0.0018 (-0.034, 0.030)0.91 $F2RL3_CpG1$ -0.77 (-2.0, 0.49)0.23-0.61 (-1.6, 0.38)0.23 $F2RL3_CpG2$ (cg03636183)-0.089 (-1.3, 1.1)0.88-0.020 (-0.89, 0.85)0.96 $AHRR_CpG1$ 0.46 (-1.8, 2.8)0.690.77 (-0.95, 2.5)0.38 $AHRR_CpG2$ 0.21 (-2.0, 2.4)0.850.54 (-1.0, 2.1)0.49 $AHRR_CpG3$ (cg05575921)-0.0068 (-2.9, 2.8)1.00.45 (-1.4, 2.3)0.63n=19	анкк_СрG3 (cg05575921)	-0.022 (-0.087, 0.042)	0.49	0.0053 (-0.037, 0.048)	0.81	
(µg/g crea.) Image: constraint of the system Image: constrais of the system Image: constra	∑OH-Phe					
Relative telomere length 0.0040 (-0.015, 0.023) 0.69 0.0084 (-0.0096, 0.026) 0.36 Relative mtDNAcn -0.0050 (-0.036, 0.026) 0.75 -0.0018 (-0.034, 0.030) 0.91 F2RL3_CpG1 -0.77 (-2.0, 0.49) 0.23 -0.61 (-1.6, 0.38) 0.23 F2RL3_CpG2 -0.089 (-1.3, 1.1) 0.88 -0.020 (-0.89, 0.85) 0.96 AHRR_CpG1 0.46 (-1.8, 2.8) 0.69 0.77 (-0.95, 2.5) 0.38 AHRR_CpG2 0.21 (-2.0, 2.4) 0.85 0.54 (-1.0, 2.1) 0.49 AHRR_CpG3 -0.0068 (-2.9, 2.8) 1.0 0.45 (-1.4, 2.3) 0.63 Creosote-exposed n=19 n=18 n=18	(µg/g crea.)					
Relative mtDNAcn -0.0050 (-0.036, 0.026) 0.75 -0.0018 (-0.034, 0.030) 0.91 F2RL3_CpG1 -0.77 (-2.0, 0.49) 0.23 -0.61 (-1.6, 0.38) 0.23 F2RL3_CpG2 -0.089 (-1.3, 1.1) 0.88 -0.020 (-0.89, 0.85) 0.96 (cg03636183) 0.46 (-1.8, 2.8) 0.69 0.77 (-0.95, 2.5) 0.38 AHRR_CpG1 0.46 (-1.8, 2.8) 0.69 0.54 (-1.0, 2.1) 0.49 AHRR_CpG3 -0.0068 (-2.9, 2.8) 1.0 0.45 (-1.4, 2.3) 0.63 Creosote-exposed n=19 n=18	Relative telomere length	0.0040 (-0.015, 0.023)	0.69	0.0084 (-0.0096, 0.026)	0.36	
F2RL3_CpG1 -0.77 (-2.0, 0.49) 0.23 -0.61 (-1.6, 0.38) 0.23 F2RL3_CpG2 -0.089 (-1.3, 1.1) 0.88 -0.020 (-0.89, 0.85) 0.96 AHRR_CpG1 0.46 (-1.8, 2.8) 0.69 0.77 (-0.95, 2.5) 0.38 AHRR_CpG2 0.21 (-2.0, 2.4) 0.85 0.54 (-1.0, 2.1) 0.49 AHRR_CpG3 -0.0068 (-2.9, 2.8) 1.0 0.45 (-1.4, 2.3) 0.63 Creosote-exposed n=19 n=18 n=18	Relative mtDNAcn	-0.0050 (-0.036, 0.026)	0.75	-0.0018 (-0.034, 0.030)	0.91	
F2RL3_CpG2 -0.089 (-1.3, 1.1) 0.88 -0.020 (-0.89, 0.85) 0.96 (cg03636183) 0.46 (-1.8, 2.8) 0.69 0.77 (-0.95, 2.5) 0.38 AHRR_CpG1 0.46 (-1.8, 2.8) 0.69 0.77 (-0.95, 2.5) 0.38 AHRR_CpG2 0.21 (-2.0, 2.4) 0.85 0.54 (-1.0, 2.1) 0.49 AHRR_CpG3 -0.0068 (-2.9, 2.8) 1.0 0.45 (-1.4, 2.3) 0.63 Creosote-exposed n=19 n=18	F2RL3_CpG1	-0.77 (-2.0, 0.49)	0.23	-0.61 (-1.6, 0.38)	0.23	
AHRR_CpG1 0.46 (-1.8, 2.8) 0.69 0.77 (-0.95, 2.5) 0.38 AHRR_CpG2 0.21 (-2.0, 2.4) 0.85 0.54 (-1.0, 2.1) 0.49 AHRR_CpG3 -0.0068 (-2.9, 2.8) 1.0 0.45 (-1.4, 2.3) 0.63 Creosote-exposed n=19 n=18	<i>F2RL3</i> _CpG2 (cg03636183)	-0.089 (-1.3, 1.1)	0.88	-0.020 (-0.89, 0.85)	0.96	
AHRR_CpG2 0.21 (-2.0, 2.4) 0.85 0.54 (-1.0, 2.1) 0.49 AHRR_CpG3 -0.0068 (-2.9, 2.8) 1.0 0.45 (-1.4, 2.3) 0.63 Creosote-exposed n=19 n=18	AHRR CpG1	0.46 (-1.8, 2.8)	0.69	0.77 (-0.95, 2.5)	0.38	
AHRR_CpG3 -0.0068 (-2.9, 2.8) 1.0 0.45 (-1.4, 2.3) 0.63 Creosote-exposed n=19 n=18	AHRR CpG?	0.21(-2.0, 2.0)	0.85	0.54 (-1.0.2.1)	0.49	
(cg055/5921) Creosote-exposed n=19 n=18	AHRR_CpG3	-0.0068 (-2.9, 2.8)	1.0	0.45 (-1.4, 2.3)	0.63	
n - 17 $n - 10$	(cg05575921) Creosote-exposed	<i>n</i> =19		<i>n</i> =18		

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1-OH-Pha				
(ug/g crea.)				
Relative telomere length	0.00053 (-0.0034, 0.0045)	0.78	-0.000041 (-0.0049, 0.0049)	0.99
Relative mtDNAcn	0.0026 (-0.0059, 0.011)	0.53	0.0019 (-0.0085, 0.012)	0.70
F2RL3 CpG1	-0.036 (-0.31, 0.24)	0.78	-0.07 (-0.40, 0.26)	0.65
<i>F2RL3</i> _CpG2	-0.019 (-0.28, 0.24)	0.88	-0.098 (-0.40, 0.21)	0.50
AHRR CnG1	0.053 (-0.47, 0.57)	0.83	-0.096 (-0.70, 0.50)	0.73
AHRR CpG2	0.055(0.47, 0.57)	0.82	-0.093(-0.67, 0.48)	0.73
AHRR_CpG3	0.05 (-0.53, 0.63)	0.86	-0.047 (-0.61, 0.51)	0.86
(cgUSS/S921) $\Sigma_2 - 3-OH-Pho$	· · ·			
(ug/g crea.)				
Relative telomere length	0.00060 (-0.0022, 0.0034)	0.65	-0.000074 (-0.0029, 0.0028)	0.96
Relative mtDNAcn	0.000048 (-0.0061, 0.0062)	0.99	0.0013 (-0.0051, 0.0077)	0.67
F2RL3 CpG1	-0.051 (-0.24, 0.14)	0.58	-0.051 (-0.24, 0.14)	0.57
<i>F2RL3</i> _CpG2 (cg03636183)	-0.033 (-0.21, 0.15)	0.70	-0.048 (-0.23, 0.13)	0.57
AHRR_CpG1	0.14 (-0.21, 0.50)	0.41	0.091 (-0.25, 0.43)	0.58
AHRR CpG2	0.11 (-0.25, 0.46)	0.53	0.051 (-0.28, 0.38)	0.75
AHRR_CpG3 (cg05575921)	0.11 (-0.29, 0.52)	0.56	0.085 (-0.23, 0.40)	0.58
4-OH-Phe				
(ng/g crea.)				
Relative telomere length	0.0000070 (-0.000014, 0.000028)	0.50	-0.00000035 (-0.000024, 0.000023)	0.98
Relative mtDNAcn	0.000013 (-0.000033, 0.000059)	0.56	0.000024 (-0.000024, 0.000072)	0.30
F2RL3_CpG1	0.00056 (-0.00088, 0.0020)	0.42	-0.00014 (-0.0017, 0.0014)	0.85
<i>F2RL3</i> _CpG2 (cg03636183)	0.00072 (-0.00060, 0.0020)	0.27	0.000030 (-0.0015, 0.0015)	0.97
AHRR_CpG1	0.0018 (-0.00084, 0.0044)	0.17	0.00076 (-0.0021, 0.0036)	0.57
AHRR_CpG2	0.0017 (-0.00090, 0.0043)	0.19	0.00068 (-0.0021, 0.0034)	0.60
AHRR_CpG3 (cg05575921)	0.0021 (-0.00078, 0.0050)	0.14	0.00081 (-0.0018, 0.0035)	0.52
∑OH-Phe				
(µg/g crea.)				
Relative telomere length	0.00035 (-0.0013, 0.002)	0.66	-0.000037 (-0.0018, 0.0018)	0.97
Relative mtDNAcn	0.00056 (-0.0031, 0.0042)	0.75	0.00091 (-0.0030, 0.0049)	0.62
F2RL3_CpG1	-0.021 (-0.14, 0.094)	0.70	-0.031 (-0.15, 0.089)	0.59
<i>F2RL3_</i> CpG2 (cg03636183)	-0.011 (-0.12, 0.096)	0.83	-0.032 (-0.14, 0.080)	0.54
AHRR_CpG1	0.071 (-0.14, 0.29)	0.49	0.028 (-0.19, 0.25)	0.79
AHRR_CpG2	0.058 (-0.15, 0.27)	0.57	0.012 (-0.20, 0.22)	0.90
AHRR_CpG3 (cg05575921)	0.062 (-0.18, 0.30)	0.59	0.033 (-0.17, 0.24)	0.74

Abbreviations: mtDNAcn (mitochondrial DNA copy number); ∑2-,3-OH-Phe (sum of 2- and 3- hydroxyphenanthrene); ∑OH-Phe (Sum of 1-, 2-, 3-, and 4-hydroxyphenanthrene) *There was 1 missing case for some of the outcomes (e.g. *AHRR*_CpG3_cg05575921)



Fig. S1. Differences in urinary PAH metabolite concentrations for chimney sweeps who spent \geq 50% of their time doing soot sweeping in the past 12 months versus those who spent \leq 50% (excluding current smokers). *P*-value was derived from Mann-Whitney U test. \sum 2-,3-OH-Phe refers to the sum of 2- and 3-hydroxyphenanthrene and similarly, \sum OH-Flu refers to the sum of 2- and 3-hydroxyphurene.

References

Alhamdow A, Lindh C, Hagberg J et al. DNA methylation of the cancer-related genes *F2RL3* and *AHRR* is associated with occupational exposure to polycyclic aromatic hydrocarbons. *Carcinogenesis* 2018;39:869-878.