

**Supplemental Material**  
**(including 3 pages and 2 tables)**

**The Essential Metals Zinc, Selenium, and Strontium Protect against**

**Chromosome Damage Caused by Polycyclic Aromatic Hydrocarbons Exposure**

Yansen Bai, Wei Feng, Suhan Wang, Xiao Zhang, Wangzhen Zhang, Meian He,

Xiaomin Zhang, Tangchun Wu, Huan Guo

**Supplementary Table 1. Correlations between levels of ten urinary essential metals, plasma BPDE-Alb adducts, and urinary  $\Sigma$ OH-PAH among study participants.**

Biomarkers	Zn	Se	Sr	Fe	Cu	Co	Mn	Mo	Rb	Sn	V	BPDE-Alb adducts	$\Sigma$ OH-PAH
Zn	1.00	0.59	0.58	0.54	0.70	0.68	0.53	0.49	0.56	0.15	0.29	0.14	0.50
Se		1.00	0.54	0.41	0.56	0.63	0.34	0.63	0.74	0.27	0.28	0.09	0.43
Sr			1.00	0.49	0.53	0.59	0.43	0.50	0.47	0.14	0.39	0.12	0.41
Fe				1.00	0.57	0.65	0.79	0.41	0.46	0.19	0.27	0.10	0.38
Cu					1.00	0.70	0.56	0.49	0.54	0.08	0.37	0.15	0.48
Co						1.00	0.62	0.57	0.61	0.15	0.32	0.12	0.48
Mn							1.00	0.34	0.40	0.13	0.23	0.10	0.34
Mo								1.00	0.62	0.26	0.24	0.10	0.33
Rb									1.00	0.28	0.25	0.14	0.40
Sn										1.00	-0.19	<b>0.01</b>	<b>-0.03</b>
V											1.00	0.09	0.33
BPDE-Alb adducts												1.00	0.21
$\Sigma$ OH-PAH													1.00

Abbreviations: Zn, Zinc; Se, Selenium; Sr, Strontium; Fe, Iron; Cu, Copper; Co, Cobalt; Mn, Manganese; Mo, Molybdenum; Rb, Rubidium; Sn, Stannum; V, Vanadium, BPDE-Alb adducts, Benzo[a]pyrene-r-7, t-8, t-9, c-10-tetrahydrotetrol albumin adducts, and  $\Sigma$ OH-PAHs, total concentration of ten urinary monohydroxy PAH.

Note: Values were Spearman's rank correlation coefficients, all  $P < 0.01$  except the bold values.

**Supplementary Table 2. The distributions of ten urinary PAH metabolites in the study subjects.**

Biomarkers	No.	Geometric Mean	Median	Selected percentiles				
				5%	25%	75%	90%	95%
Urinary OHPAHs ( $\mu\text{g}/\text{mmol}$ creatinine)								
1-OHNa	1245	1.75	1.68	0.49	0.98	3.00	5.11	7.14
2-OHNa	1245	1.59	1.70	0.39	0.91	2.78	4.54	6.21
2-OHFlu	1245	0.93	0.89	0.32	0.56	1.51	2.63	3.69
9-OHFlu	1245	0.39	0.57	0.01	0.23	1.25	2.58	4.03
1-OHPh	1245	0.76	0.87	0.10	0.4	1.61	2.62	4.01
2-OHPh	1245	0.29	0.29	0.05	0.18	0.53	0.88	1.34
3-OHPh	1245	0.33	0.36	0.04	0.20	0.64	1.17	1.60
4-OHPh	1245	0.21	0.32	0.003	0.13	0.65	1.22	1.78
9-OHPh	1245	0.72	0.74	0.16	0.39	1.37	2.55	3.70
1-OHP	1245	3.22	3.20	0.86	1.82	5.64	9.51	12.89

Abbreviations: 1-OHNa, 1-hydroxynaphthalene; 2-OHNa, 2-hydroxynaphthalene; 2-OHFlu, 2-hydroxyfluorene; 9-OHFlu, 9-hydroxyfluorene; 1-OHPh, 1-hydroxyphenanthrene; 2-OHPh, 2-hydroxyphenanthrene; 3-OHPh, 3-hydroxyphenanthrene; 4-OHPh, 24-hydroxyphenanthrene; 9-OHPh, 9-hydroxyphenanthrene; 1-OHP, 1-hydroxypyrene.