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Supplementary Materials

Metal Exposure in Chinese Pregnant Women from Dalian and Association with Clinical Indicators

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Table S1. Operating parameters of ICP-MS.

Parameter	Type/Value
RF Power	1550 W
RF Mathing	1.80 V
Smple Depth	10.0 mm
Carrier Gas	1.07L/min
Dilution Gas	0.90 L/min
Nebulizer Pump	0.1 rps
Discriminator	4.4 mV
Analog HV	2130 V
Pulse HV	1069 V

Table S2. Recovery rates of target metals in serum samples spiked after extraction (1 μg·L^{-1}).

Element	Background Value (μg·L^{-1})	Determined Value (μg·L^{-1})	Average Recovery (n = 5, %)
Li	14.59 ± 0.50	17.02 ± 0.71	109.15 ± 4.54
Be	0.0003 ± 0.0002	0.87 ± 0.01	87.19 ± 0.64
Al	2.61 ± 0.34	3.43 ± 0.52	95.06 ± 14.53
V	0.02 ± 0.003	0.80 ± 0.02	78.76 ± 1.77
Cr	0.16 ± 0.03	1.14 ± 0.05	98.45 ± 4.18
Mn	0.33 ± 0.13	1.26 ± 0.05	95.01 ± 3.57
Fe	75.43 ± 37.37	55.69 ± 2.50	72.87 ± 3.27
Co	0.02 ± 0.004	0.95 ± 0.01	93.42 ± 1.13
Ni	0.18 ± 0.04	1.39 ± 0.51	117.62 ± 43.25
Cu	59.60 ± 0.09	59.65 ± 0.77	98.43 ± 1.28
Zn	53.68 ± 3.41	57.57 ± 5.29	105.29 ± 9.68
Ga	0.002 ± 0.002	0.94 ± 0.02	93.93 ± 1.80
As	0.21 ± 0.01	1.32 ± 0.02	108.47 ± 1.87
Se	5.42 ± 0.03	6.75 ± 0.11	105.10 ± 1.68
Rb	10.25 ± 0.08	11.25 ± 0.12	100.00 ± 1.04
Sr	2.56 ± 0.06	3.66 ± 0.05	102.84 ± 1.42
Ag	0.004 ± 0.004	0.83 ± 0.01	82.53 ± 1.40
Cd	0.004 ± 0.001	0.95 ± 0.01	94.60 ± 1.44
Cs	0.04 ± 0.001	1.04 ± 0.01	99.73 ± 1.00
Ba	0.36 ± 0.06	1.46 ± 0.09	107.20 ± 6.50
Hg	0.02 ± 0.002	0.01 ± 0.0004	1.33 ± 0.06
Tl	0.003 ± 0.002	0.93 ± 0.01	92.57 ± 1.16
Pb	0.11 ± 0.06	1.03 ± 0.03	93.15 ± 2.82
U	0.0004 ± 0.0002	0.91 ± 0.01	91.34 ± 1.34

Table S3. Recovery rates of target metals in serum samples spiked after extraction (5 μg·L^{-1}).

Element	Background Value (μg·L^{-1})	Determined Value (μg·L^{-1})	Average Recovery (n = 5, %)
Li	14.59 ± 0.50	24.31 ± 0.56	124.05 ± 2.86
Be	0.0003 ± 0.0002	4.42 ± 0.05	88.32 ± 1.05
Al	2.61 ± 0.34	6.98 ± 0.42	91.73 ± 5.47
V	0.02 ± 0.003	3.83 ± 0.02	76.19 ± 0.38
Cr	0.16 ± 0.03	5.07 ± 0.03	98.24 ± 0.65
Mn	0.33 ± 0.13	5.25 ± 0.08	98.63 ± 1.43
Fe	75.43 ± 37.37	67.77 ± 1.72	84.26 ± 2.13
Co	0.02 ± 0.004	4.60 ± 0.03	91.73 ± 0.54
Ni	0.18 ± 0.04	5.07 ± 0.14	97.98 ± 2.65
Cu	59.60 ± 0.09	63.30 ± 0.37	97.98 ± 0.57
Zn	53.68 ± 3.41	57.87 ± 3.93	98.63 ± 6.70
Ga	0.002 ± 0.002	4.66 ± 0.02	93.08 ± 0.47
As	0.21 ± 0.01	5.72 ± 0.03	109.71 ± 0.61
Se	5.42 ± 0.03	12.05 ± 0.05	115.63 ± 0.48
Rb	10.25 ± 0.08	15.04 ± 0.07	98.59 ± 0.44
Sr	2.56 ± 0.06	7.63 ± 0.04	100.89 ± 0.59
Ag	0.004 ± 0.004	4.15 ± 0.03	82.88 ± 0.59
Cd	0.004 ± 0.001	4.62 ± 0.03	92.28 ± 0.54
Cs	0.04 ± 0.001	4.94 ± 0.03	98.01 ± 0.55
Ba	0.36 ± 0.06	5.44 ± 0.05	101.39 ± 1.02
Hg	0.02 ± 0.002	0.01 ± 0.001	0.27 ± 0.02
Tl	0.003 ± 0.002	4.59 ± 0.03	91.81 ± 0.67
Pb	0.11 ± 0.06	4.72 ± 0.04	92.33 ± 0.68
U	0.0004 ± 0.0002	4.50 ± 0.03	89.93 ± 0.59

Table S4. Linear relationship of standard curves, method detection limits (MDLs).

Element	Linear Range (μg/L)	Correlation Coefficient	MDLs (μg/L)
Mg	0.01-50	0.9998	1.1802
Ca	0.01-50	0.9998	0.8922
V	0.01-50	1.0000	0.0029
Cr	0.01-50	0.9999	0.1032
Mn	0.01-50	1.0000	0.0145
Fe	0.01-50	1.0000	7.4934
Co	0.01-50	1.0000	0.0007
Ni	0.01-50	0.9999	0.0409
Cu	0.01-50	0.9999	0.0507
Zn	0.01-50	0.9998	0.7598
Ga	0.01-50	1.0000	0.0011
As	0.01-50	1.0000	0.0011
Se	0.01-50	1.0000	0.0046
Rb	0.01-50	1.0000	0.0012
Sr	0.01-50	0.9999	0.0116
Ag	0.01-50	1.0000	0.0227
Cd	0.01-50	1.0000	0.0014
Cs	0.01-50	1.0000	0.0004
Ba	0.01-50	0.9999	0.2287
Hg	0.01-50	0.9999	0.0016
Pb	0.01-50	0.9998	0.0270
U	0.01-50	0.9998	0.0008

Table S5. Concentrations (μg·L⁻¹) of metals in pregnant woman's serum samples from Dalian city.

Element	Detection Frequency (%)	GM (GSD) [a]	Median	25th Percentile	50th Percentile	75th Percentile
Mg	100	18,493.37(1.32)	17,211.71	15,465.91	17,211.71	21,405.07
Ca	100	8060.96(1.19)	7869.57	7206.10	7869.57	8767.79
Mn	100	3.95(1.73)	3.64	2.92	3.64	4.95
Fe	100	895.11(1.59)	902.53	658.96	902.53	1203.03
Co	100	0.30(2.10)	0.33	0.21	0.33	0.47
Cu	100	1956.43(1.24)	1919.91	1688.52	1919.91	2243.35
Zn	100	605.68(1.39)	601.50	501.53	601.50	686.87
Se	100	62.32(1.37)	61.31	51.81	61.31	75.09
V	99.55	0.41(1.52)	0.40	0.33	0.40	0.49
Ni	96.41	2.65(2.48)	2.46	1.61	2.46	4.20
Rb	100	140.28(1.22)	137.50	121.37	137.50	161.14
Sr	100	37.75(1.38)	37.70	29.82	37.70	44.99
Ag	84.30	0.63(3.25)	0.48	0.27	0.48	2.16
Cs	100	0.42(1.39)	0.41	0.34	0.41	0.52
Ba	99.55	24.61(2.01)	24.85	14.78	24.85	39.41
As	100	0.98(2.58)	1.01	0.50	1.01	1.82
Cd	78.03	0.07(2.54)	0.08	0.03	0.08	0.14
Hg	100	0.21(1.96)	0.21	0.13	0.21	0.33
Pb	81.17	1.39(2.52)	1.39	0.69	1.39	0.33
Cr	91.93	2.57(1.82)	2.33	1.77	2.33	3.31

[a] GM: Geometric mean; GSD: Geometric standard deviation.

Table S6. Concentration distribution and composition of metals in serum samples of pregnant women in Case and Control (μg·L⁻¹).

Elements	Control (n = 28）	Case (n = 181)	*p*-Value [a]
Mg	19,263.83	19,291.46	0.648
Ca	8380.12	8160.55	0.589
V	0.41	0.49	0.550
Cr	2.73	3.42	0.567
Mn	4.08	5.44	0.992
Fe	971.82	1002.26	0.699
Co	0.40	0.43	0.675
Ni	3.14	7.47	0.682
Cu	2069.55	1992.97	0.337
Zn	596.45	660.90	0.680
As	1.53	1.58	0.992
Se	63.61	65.89	0.232
Rb	143.40	143.21	0.979
Sr	41.51	39.67	0.122
Ag	0.72	1.31	0.011
Cd	0.09	0.12	0.463
Cs	0.44	0.45	0.491
Ba	38.02	30.48	0.500
Hg	0.21	0.27	0.021
Pb	1.43	2.37	0.077

[a] *p*-value calculated by Mann-Whitney U test.

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