

Supplemental material. Table S1. Medians (interquartile ranges) of selected kidney function markers, stratified by sex, age, BMI, smoking, and tertiles (T1-T3) of kidney cadmium, blood cadmium, and urinary cadmium adjusted for creatinine.

	GFR (mL/min)	24h U-Crea (mmol/L)	ON U-Crea (mmol/L)	24h U-Alb/h (mg/h)	24h U-AlbCrea (mg/gC)	ON U-Alb/h (mg/h)	ON U-AlbCrea (mg/gC)	24h U-A1M/h (mg/h)	24h U-A1MCrea (mg/gC)	ON U-A1M/h (mg/h)	ON U-A1MCrea (mg/gC)
All	98 (21.5)	6.5 (3.6)	11.0 (8.2)	0.24 (0.14)	4.5 (3.5)	0.20 (0.13)	4.0 (2.2)	0.36 (0.16)	7.0 (3.3)	0.23 (0.14)	4.4 (3.5)
Men	99 (20)	8.1 (3.45)	13 (6.15)	0.24 (0.18)	3.7 (2.0)	0.22 (0.15)	3.4 (2.1)	0.38 (0.15)	5.9 (2.9)	0.25 (0.13)	3.7 (2.8)
Women	97 (22)	5.5 (2.4)	9.7 (8.8)	0.24 (0.13)	5.2 (3.9)	0.18 (0.08)	4.2 (2.0)	0.34 (0.15)	7.7 (2.8)	0.20 (0.13)	4.7 (3.2)
Age<51 years	101.5 (23.5)	6.5 (3.3)	12.0 (10.1)	0.28 (0.20)	4.2 (4.5)	0.18 (0.14)	3.7 (1.7)	0.41 (0.15)	7.1 (2.7)	0.24 (0.14)	4.0 (3.4)
Age≥51 years	94 (15.5)	6.4 (3.6)	10.0 (8.4)	0.23 (0.09)	4.6 (2.4)	0.20 (0.14)	4.3 (2.6)	0.34 (0.11)	7.0 (3.2)	0.23 (0.12)	4.5 (3.5)
BMI<25	96 (20)	5.9 (3.2)	10.0 (6.9)	0.23 (0.11)	4.3 (3.3)	0.17 (0.08)	3.7 (1.8)	0.35 (0.24)	7.6 (4.2)	0.22 (0.16)	5.2 (3.5)
BMI≥25	99 (21)	6.8 (3.9)	12.0 (9.1)	0.25 (0.21)	4.6 (4.1)	0.22 (0.13)	4.6 (4.1)	0.37 (0.14)	6.7 (2.5)	0.24 (0.13)	4.0 (2.9)
Never-smokers	95 (15)	7.0 (2.95)	13.0 (7.0)	0.24 (0.18)	4.2 (4.8)	0.18 (0.17)	3.5 (2.9)	0.37 (0.14)	7.2 (2.2)	0.22 (0.13)	3.9 (4.0)
Ever-smokers	100 (20)	6.3 (3.5)	9.9 (7.5)	0.24 (0.14)	4.6 (2.6)	0.20 (0.13)	4.1 (2.1)	0.36 (0.16)	7.0 (3.6)	0.23 (0.15)	4.7 (2.9)
K-Cd (µg/g ww)T1	96.5 (14)	7.6 (3.9)	14.0 (7.3)	0.23 (0.19)	4.9 (4.5)	0.22 (0.18)	3.5 (2.6)	0.37 (0.11)	5.9 (2.8)	0.20 (0.11)	2.9 (1.8)
K-Cd (µg/g ww) T2	100 (22)	6.4 (3.1)	10 (8.5)	0.24 (0.14)	5.3 (3.5)	0.19 (0.11)	4.1 (2.3)	0.36 (0.17)	7.4 (3.4)	0.22 (0.14)	4.5 (3.2)
K-Cd (µg/g ww) T3	97.5 (24.5)	6.3 (2.8)	8.9 (6.8)	0.23 (0.14)	4.4 (2.4)	0.20 (0.09)	4.0 (2.1)	0.34 (0.18)	7.5 (3.8)	0.26 (0.24)	5.5 (3.8)
B-Cd (µg/L) T1	96 (12)	7.2 (3.9)	12.5 (7.7)	0.23 (0.18)	3.7 (3.5)	0.18 (0.14)	3.3 (2.6)	0.36 (0.10)	6.2 (2.9)	0.22 (0.11)	3.4 (2.9)
B-Cd (µg/L) T2	95 (17.5)	6.7 (3.8)	12.0 (8.9)	0.24 (0.11)	4.5 (2.2)	0.20 (0.08)	3.6 (1.8)	0.38 (0.15)	6.9 (2.2)	0.21 (0.14)	4.0 (3.3)
B-Cd (µg/L) T3	102 (24)	6.2 (2.5)	9.1 (7.8)	0.28 (0.16)	5.4 (5.6)	0.21 (0.15)	4.2 (3.2)	0.36 (0.22)	8.3 (4.5)	0.27 (0.11)	5.2 (3.7)
24h U-CdCrea (µg/gC) T1	97 (24)	7.0 (3.5)	13.0 (9.2)	0.25 (0.18)	4.0 (3.1)	0.20 (0.16)	3.9 (2.2)	0.37 (0.12)	6.8 (2.7)	0.23 (0.13)	4.0 (3.0)
24h U-CdCrea (µg/gC) T2	98 (17)	6.3 (3.7)	10.0 (6.9)	0.23 (0.10)	4.0 (2.2)	0.19 (0.08)	3.6 (1.3)	0.36 (0.18)	6.8 (4.2)	0.22 (0.13)	4.5 (2.9)
24h U-CdCrea (µg/gC) T3	98 (21)	6.3 (2.5)	10.0 (8.8)	0.26 (0.14)	5.0 (3.7)	0.20 (0.14)	4.9 (2.1)	0.34 (0.16)	7.9 (3.8)	0.23 (0.17)	5.2 (4.6)
ON U-CdCrea (µg/gC) T1	95 (15)	7.0 (3.6)	13.0 (9.0)	0.24 (0.28)	4.0 (5.6)	0.18 (0.19)	3.3 (2.5)	0.37 (0.15)	6.8 (2.1)	0.22 (0.11)	3.7 (2.3)
ON U-CdCrea (µg/gC) T2	100 (23)	6.3 (4.0)	12.0 (7.9)	0.24 (0.14)	4.3 (2.8)	0.19 (0.08)	3.9 (1.4)	0.31 (0.12)	6.7 (3.3)	0.20 (0.12)	4.0 (2.7)
ON U-CdCrea (µg/gC) T3	96 (19.5)	5.9 (2.7)	9.4 (5.7)	0.24 (0.14)	4.8 (2.1)	0.20 (0.13)	4.4 (2.1)	0.36 (0.16)	8.1 (4.0)	0.27 (0.19)	5.3 (4.1)

Supplemental material. Table S2. Correlations between K-/B-/U-Cd and markers of kidney function, per hour and normalized for creatinine (Spearman correlation coefficients).

	K-Cd ($\mu\text{g/g}$ ww) ^a	B-Cd ($\mu\text{g/L}$)	24h U-Cd24 ($\mu\text{g}/24\text{h}$) ^b	ON U-Cd/h ($\mu\text{g}/\text{h}$) ^c	24h U- CdCrea ($\mu\text{g}/\text{gC}$) ^d	ON U- CdCrea ($\mu\text{g}/\text{gC}$) ^d
GFR (mL/min/1.73 m ²)	-0.008	0.10	0.11	0.13	0.03	0.07
eGFR (ml/min/1.73 m ²)	-0.01	-0.13	-0.21	-0.22*	-0.33***	-0.23*
S-Cystatin (mg/L)	-0.11	0.08	0.16	0.12	0.22	0.11
24h U-Alb/h (mg/h) ^c	-0.07	-0.01	0.14		0.02	
24h U-AlbCrea (mg/gC) ^d	0.19	0.21	0.12		0.32*	
ON U-Alb/h (mg/h) ^c	-0.05	0.05		0.32*		0.12
ON U-AlbCrea (mg/gC) ^d	0.15	0.23*		0.29*		0.41*
24h U-KIM/h (ng/h) ^c	0.07	0.07	0.34*		0.17	
24h U-KIMCrea (ng/mgC) ^d	0.26*	0.32*	0.33*		0.43*	
ON U-KIM/h (ng/h) ^c	0.07	0.11		0.30*		0.16
ON U-KIMCrea (ng/mgC) ^d	0.09	0.28*		0.31*		0.39*
24h U-NAG/h (U/h) ^c	0.04	-0.03	0.18		-0.03	
24h U-NAGCrea (U/gC) ^d	0.34*	0.32*	0.36*		0.40*	
ON U-NAG/h (U/h) ^c	-0.03	0.11		0.29*		0.15
ON U-NAGCrea (U/gC) ^d	0.20	0.33*		0.36*		0.43*
24h U-A1M/h (mg/h) ^c	-0.11	-0.02	0.04		-0.12	
24h U-A1MCrea (mg/gC) ^d	0.27*	0.29*	0.11		0.32*	
ON U-A1M/h (mg/h) ^c	0.18	0.16		0.30*		0.15
ON U-A1MCrea (mg/gC) ^d	0.36*	0.29*		0.27*		0.36*
24h U-B2M/h (mg/h) ^c	-0.02	-0.02	-0.14		-0.18	
24h U-B2MCrea (mg/gC) ^d	0.18	0.16	-0.09		0.06	
ON U-B2M/h (mg/h) ^c	-0.11	-0.02		-0.06		-0.15
ON U-B2MCrea (mg/gC) ^d	0.01	0.07		-0.07		-0.003
24h U-RBP/h ($\mu\text{g}/\text{h}$) ^c	-0.06	-0.07	0.16		-0.008	
24h U-RBPCrea ($\mu\text{g}/\text{gC}$) ^d	0.20	0.23*	0.24*		0.31*	
ON U-RBP/h ($\mu\text{g}/\text{h}$) ^c	0.03	0.12		0.32*		0.15
ON U-RBPCrea ($\mu\text{g}/\text{gC}$) ^d	0.24*	0.33*		0.35*		0.40*

*p < 0.05. ***p < 0.005. ON = overnight sample. 24h = 24-hour sample. ^aWet weight. ^bUrinary cadmium excretion rate expressed per 24 hours. ^cExcretion rate in urine expressed per hour. ^dConcentration in urine adjusted for urinary creatinine concentration.

Supplemental material. Table S3. Alfa-1-microglobulin in urine. Correlations between parameters (Spearman correlation coefficients).

	K-Cd ($\mu\text{g/g}$ ww) ^a	Age	Weight	Pack- years	24-h urinary flow rate (ml/h)	ON urinary flow rate (ml/h)	24h U- A1M/h (mg/h) ^b	24h U- A1MCrea (mg/gC) ^c	ON U- A1M/h (mg/h) ^b	ON U- A1MCrea (mg/gC) ^c
K-Cd ($\mu\text{g/g ww}$) ^a		0.28*	-0.29*	0.51*	-0.15	0.06	-0.11	0.27*	0.18	0.36*
Age			-0.02	0.06	-0.28*	0.04	-0.26*	0.08	0.04	0.16
Weight				-0.08	-0.09	0.05	0.05	-0.49*	0.008	-0.38*
Pack-years					-0.05	0.08	-0.05	0.11	0.07	0.13
24h urinary flow rate (ml/h)						0.45*	0.66*	0.35*		
ON urinary flow rate (ml/h)									0.77*	0.61*
24h U-A1M (mg/h) ^b								0.57*	0.44*	0.32*
24 U-A1MCrea (mg/gC) ^c									0.33*	0.66*
ON U-A1M/h (mg/h) ^b										0.78

ON=overnight sample. 24h=24-hour sample. * $p < 0.05$. ^a Wet weight. ^b Excretion rate in urine expressed per hour. ^c Concentration in urine adjusted for urinary creatinine concentration.

Supplemental Material, Table S4. U-NAG. Correlations between parameters (Spearman correlation coefficients).

	K-Cd ($\mu\text{g/g}$ ww) ^a	Age	Weight	Pack- years	24-h urinary flow rate (ml/h)	ON urinary flow rate (ml/h)	24h U- NAG/h (U/h) ^b	24h U- NAGCrea (U/gC) ^c	ON U- NAG/h (U/h) ^b	ON U- NAGCrea (U/gC) ^c
K-Cd ($\mu\text{g/g}$ ww) ^a		0.28*	-0.29*	0.51*	-0.15	0.06	0.04	0.34*	-0.03	0.20
Age			-0.02	0.06	-0.28*	0.04	0.03	0.10	0.06	0.21
Weight				-0.08	-0.09	0.05	0.12	-0.31*	0.15	-0.13
Pack-years					-0.05	0.08	0.20	0.29*	0.22	0.25
24h urinary flow rate (ml/h)						0.45*	-0.04	-0.21		
ON urinary flow rate (ml/h)									0.07	-0.10
24h U-NAG/h (U/h) ^b								0.64*	0.55*	0.50
24 U-NAGCrea (U/gC) ^c									0.44*	0.82*
ON U-NAG/h (U/h) ^b										0.75*

ON=overnight sample. 24h=24-hour sample. *p<0.05. ^a Wet weight. ^b Excretion rate in urine expressed per hour. ^c Concentration in urine adjusted for urinary creatinine concentration.

Supplemental Material, Table S5. U-KIM. Correlations between parameters (Spearman correlation coefficients).

	K-Cd ($\mu\text{g/g}$ ww) ^a	Age	Weight	Pack- years	24-h urinary flow rate (ml/h)	ON urinary flow rate (ml/h)	24h U- KIM/h (ng/h) ^b	24h U- KIMCrea (ng/mgC) ^c	ON U- KIM/h (ng/h) ^b	ON U- KIMCrea (ng/mgC) ^c
K-Cd ($\mu\text{g/g}$ ww) ^a		0.28*	-0.29*	0.51*	-0.15	0.06	0.07	0.26*	-0.07	0.09
Age			-0.02	0.06	-0.28*	0.04	0.12	0.26*	0.08	0.15
Weight				-0.08	-0.09	0.05	0.19	-0.14	0.23*	-0.09
Pack-years					-0.05	0.08	0.19	0.33*	0.22*	0.28*
24h urinary flow rate (ml/h)						0.45*	-0.19	-0.32*		
ON urinary flow rate (ml/h)									0.12	-0.04
24h U-KIM/h (ng/h) ^b								0.82*	0.69*	0.58*
24 U-KIMCrea (ng/mgC) ^c									0.66*	0.78*
ON KIM/h (ng/h) ^b										0.85*

ON=overnight sample. 24h=24-hour sample. * $p < 0.05$. ^a Wet weight. ^b Excretion rate in urine expressed per hour. ^c Concentration in urine adjusted for urinary creatinine concentration.