

Urine Trace Elements - Age and Sex dependent reference ranges:

Metal	Random Urine	24 hour Urine
Antimony	0.000 - 0.056 µg/L	0.000 - 0.056 µg/L
	0.00 - 0.46 nmol/L	0.00 - 0.46 nmol/L
	Age/Sex dependent nmol/mol cr	0.000 – 0.084 µg/d
	Age/Sex dependent ng/g cr	0.00 - 0.69 nmol/d
Arsenic, Inorg.	0.0 - 10.0 µg/L	0.0 - 10.0 µg/L
	0.00 - 0.13 µmol/L	0.00 - 0.13 µmol/L
	Age/Sex dependent µmol/mol cr	0.0 - 15.0 µg/d
	Age/Sex dependent µg/g cr	0.00 – 0.20 µmol/d
Arsenic, Total	0.0 - 40.0 µg/L	0.0 - 40.0 µg/L
	0.00 - 0.53 µmol/L	0.00 - 0.53 µmol/L
	Age/Sex dependent µmol/mol cr	0.0 - 59.9 µg/d
	Age/Sex dependent µg/g cr	0.00 - 0.80 µmol/d
Beryllium	0.000 - 0.100 µg/L	0.000 - 0.100 µg/L
	0.0 - 11.1 nmol/L	0.0 - 11.1 nmol/L
	Age/Sex dependent µmol/mol cr	0.00 - 0.15 µg/d
	Age/Sex dependent ng/g cr	0.0 - 16.7 nmol/d
Boron	0.50 - 7.00 mg/L	0.50 - 7.00 mg/L
	0.05 - 0.65 mmol/L	0.05 - 0.65 mmol/L
	Age/Sex dependent mmol/mol cr	0.8 - 10.5 mg/d
	Age/Sex dependent mg/g cr	0.074 - 0.970 mmol/d
Chromium	0.09 - 0.52 µg/L	0.09 - 0.52 µg/L
	1.7 - 10.0 nmol/L	1.7 - 10.0 nmol/L
	Age/Sex dependent µmol/mol cr	0.20 - 0.80 µg/d
	Age/Sex dependent µg/g cr	3.8 - 15.4 nmol/d

Urine Trace Elements - Age and Sex dependent reference ranges:

Metal	Random Urine	24 hour Urine
Cobalt	0.07 - 0.83 µg/L	0.07 - 0.83 µg/L
	1.2 - 14.1 nmol/L	1.2 - 14.1 nmol/L
	Age/Sex dependent µmol/mol cr	0.10 - 1.25 µg/d
	Age/Sex dependent µg/g cr	1.7 - 21.2 nmol/d
Lead	0.0 – 3.0 µg/L	0.0 – 3.0 µg/L
	0.0 – 14.5 nmol/L	0.0 – 14.5 nmol/L
	Age/Sex dependent µmol/mol cr	0.0 – 4.0 µg/d
	Age/Sex dependent µg/g cr	0.0 - 19.3 nmol/d
Manganese	0.070 – 0.500 µg/L	0.070 – 0.500 µg/L
	1.3 – 9.1 nmol/L	1.3 – 9.1 nmol/L
	Age/Sex dependent µmol/mol cr	0.099 – 0.802 µg/d
	Age/Sex dependent µg/g cr	1.8 - 14.6 nmol/d
Mercury	0.0 – 3.00 µg/L	0.0 – 3.00 µg/L
	0.0 – 15.0 nmol/L	0.0 – 15.0 nmol/L
	Age/Sex dependent µmol/mol cr	0.0 – 4.0 µg/d
	Age/Sex dependent µg/g cr	0.0 – 20.0 nmol/d
Nickel	0.00 - 3.50 µg/L	0.00 - 3.50 µg/L
	0.0 - 59.6 nmol/L	0.0 - 59.6 nmol/L
	Age/Sex dependent µmol/mol cr	0.0 - 5.0 µg/d
	Age/Sex dependent µg/g cr	0.0 - 85.1 nmol/d
Selenium	20.0 - 90.0 µg/L	20.0 - 90.0 µg/L
	0.25 - 1.14 µmol/L	0.25 - 1.14 µmol/L
	Age/Sex dependent µmol/mol cr	30.3 - 130.3 µg/d
	Age/Sex dependent µg/g cr	0.38 - 1.65 µmol/d

Urine Trace Elements - Age and Sex dependent reference ranges:

Metal	Random Urine	24 hour Urine
Silver	0.000 - 0.050 µg/L	0.000 - 0.050 µg/L
	0.00 - 0.46 nmol/L	0.00 - 0.46 nmol/L
	Age/Sex dependent nmol/mol cr	0.000 - 0.066 µg/d
	Age/Sex dependent ng/g cr	0.00 - 0.61 nmol/d
	Age/Sex dependent mg/g cr	7.8 - 25.0 mmol/d
Thallium	0.000 - 0.400 µg/L	0.000 - 0.400 µg/L
	0.00 - 1.96 nmol/L	0.00 - 1.96 nmol/L
	Age/Sex dependent nmol/mol cr	0.000 - 0.600 µg/d
	Age/Sex dependent ng/g cr	0.00 - 2.93 nmol/d
Vanadium	0.013 - 0.120 µg/L	0.013 - 0.120 µg/L
	0.26 - 2.36 nmol/L	0.26 - 2.36 nmol/L
	Age/Sex dependent nmol/mol cr	0.02 - 0.20 µg/d
	Age/Sex dependent ng/g cr	0.40 - 3.90 nmol/d

Urine Trace Elements - Age and Sex dependent reference ranges:

Antimony	nmol/mol creatinine		ng/g creatinine		Arsenic, Total	µmol/mol creatinine		µg/g creatinine	
	Age	Female	Male	Female		Male	Age	Female	Male
0-11	0-54.7	0-52.2	0-58.9	0-56.3	0-11	0-63.6	0-60.7	0-42.1	0-40.2
12-19	0-33.3	0-32.4	0-35.9	0-34.9	12-19	0-38.7	0-37.6	0-25.6	0-24.9
20-29	0-37.7	0-28.7	0-40.6	0-30.9	20-29	0-43.8	0-33.4	0-29.0	0-22.1
30-39	0-45.5	0-33.6	0-49.0	0-36.1	30-39	0-52.9	0-39.0	0-35.0	0-25.8
40-49	0-54.1	0-35.4	0-58.2	0-38.1	40-49	0-62.8	0-41.1	0-41.6	0-27.2
50-59	0-63.9	0-40.7	0-68.8	0-43.8	50-59	0-74.2	0-47.3	0-49.1	0-31.3
60-69	0-63.0	0-42.6	0-67.8	0-45.8	60-69	0-73.2	0-49.4	0-48.4	0-32.7
70-79	0-65.7	0-46.0	0-70.7	0-49.5	70-79	0-76.3	0-53.4	0-50.5	0-35.4
>80	0-80.7	0-52.2	0-86.8	0-56.3	>80	0-93.7	0-60.7	0-62.0	0-40.2

Arsenic, Inorganic	µmol/mol creatinine		µg/g creatinine		Beryllium	µmol/mol creatinine		ng/g creatinine	
	Age	Female	Male	Female		Male	Age	Female	Male
0-11	0-15.9	0-15.2	0-10.5	0-10.1	0-11	0-1.32	0-1.26	0-105	0-101
12-19	0-9.7	0-9.4	0-6.4	0-6.2	12-19	0-0.80	0-0.78	0-64	0-62
20-29	0-10.9	0-8.3	0-7.2	0-5.5	20-29	0-0.91	0-0.69	0-72	0-55
30-39	0-13.2	0-9.7	0-8.7	0-6.5	30-39	0-1.10	0-0.81	0-87	0-65
40-49	0-15.7	0-10.3	0-10.4	0-6.8	40-49	0-1.31	0-0.85	0-104	0-68
50-59	0-18.5	0-11.8	0-12.3	0-7.8	50-59	0-1.54	0-0.98	0-123	0-78
60-69	0-18.3	0-12.4	0-12.1	0-8.2	60-69	0-1.52	0-1.03	0-121	0-82
70-79	0-19.1	0-13.4	0-12.6	0-8.8	70-79	0-1.59	0-1.11	0-126	0-88
>80	0-23.4	0-15.2	0-15.5	0-10.1	>80	0-1.95	0-1.26	0-155	0-101

Urine Trace Elements - Age and Sex dependent reference ranges:

Boron	mmol/mol creatinine		mg/g creatinine		Chromium	µmol/mol creatinine		µg/g creatinine	
	Age	Female	Male	Female		Male	Age	Female	Male
0-11	5.3-77.1	5.3-73.6	0.5-7.4	0.5-7.0	0-11	0.20-1.19	0.20-1.14	0.09-0.55	0.09-0.52
12-19	3.4-46.9	3.3-45.6	0.3-4.5	0.3-4.4	12-19	0.13-0.72	0.12-0.70	0.06-0.33	0.06-0.32
20-29	3.8-53.1	2.9-40.5	0.4-5.1	0.3-3.9	20-29	0.14-0.82	0.11-0.62	0.07-0.38	0.05-0.29
30-39	4.6-64.1	3.4-47.3	0.4-6.1	0.3-4.5	30-39	0.17-0.99	0.13-0.73	0.08-0.45	0.06-0.34
40-49	5.4-76.2	3.6-49.8	0.5-7.3	0.3-4.8	40-49	0.20-1.18	0.13-0.77	0.09-0.54	0.06-0.35
50-59	6.4-89.9	4.1-57.3	0.6-8.6	0.4-5.5	50-59	0.24-1.39	0.15-0.88	0.11-0.64	0.07-0.41
60-69	6.3-88.7	4.3-60.0	0.6-8.5	0.4-5.7	60-69	0.24-1.37	0.16-0.93	0.11-0.63	0.07-0.43
70-79	6.6-92.5	4.6-64.8	0.6-8.8	0.4-6.2	70-79	0.25-1.43	0.17-1.00	0.11-0.66	0.08-0.46
>80	8.1-113.6	5.3-73.6	0.8-10.9	0.5-7.0	>80	0.30-1.75	0.20-1.14	0.14-0.81	0.09-0.52

Cobalt	µmol/mol creatinine		µg/g creatinine		Lead	µmol/mol creatinine		µg/g creatinine	
	Age	Female	Male	Female		Male	Age	Female	Male
0-11	0.13-1.68	0.13-1.60	0.07-0.87	0.07-0.83	0-11	0-1.72	0-1.65	0-3.2	0-3.0
12-19	0.09-1.02	0.08-0.99	0.04-0.53	0.04-0.52	12-19	0-1.05	0-1.02	0-1.9	0-1.9
20-29	0.10-1.15	0.07-0.88	0.05-0.60	0.04-0.46	20-29	0-1.19	0-0.90	0-2.2	0-1.7
30-39	0.12-1.39	0.09-1.03	0.06-0.73	0.05-0.54	30-39	0-1.43	0-1.06	0-2.6	0-1.9
40-49	0.14-1.66	0.09-1.08	0.07-0.86	0.05-0.56	40-49	0-1.70	0-1.11	0-3.1	0-2.0
50-59	0.16-1.96	0.11-1.25	0.09-1.02	0.05-0.65	50-59	0-2.01	0-1.28	0-3.7	0-2.3
60-69	0.16-1.93	0.11-1.30	0.08-1.00	0.06-0.68	60-69	0-1.98	0-1.34	0-3.6	0-2.5
70-79	0.17-2.01	0.12-1.41	0.09-1.05	0.06-0.73	70-79	0-2.07	0-1.45	0-3.8	0-2.7
>80	0.21-2.47	0.13-1.60	0.11-1.29	0.07-0.83	>80	0-2.54	0-1.65	0-4.7	0-3.0

Urine Trace Elements - Age and Sex dependent reference ranges:

Manganese	µmol/mol creatinine		µg/g creatinine		Mercury	µmol/mol creatinine		µg/g creatinine	
	Age	Female	Male	Female		Male	Age	Female	Male
0-11	0.14-1.08	0.14-1.03	0.07-0.53	0.07-0.50	0-11	0-1.78	0-1.70	0-3.2	0-3.0
43800	0.09-0.66	0.09-0.64	0.04-0.32	0.04-0.31	12-19	0-1.08	0-1.05	0-1.9	0-1.9
20-29	0.10-0.75	0.08-0.57	0.05-0.36	0.04-0.28	20-29	0-1.23	0-0.94	0-2.2	0-1.7
30-39	0.13-0.90	0.09-0.66	0.06-0.44	0.05-0.32	30-39	0-1.48	0-1.09	0-2.6	0-1.9
40-49	0.15-1.07	0.10-0.70	0.07-0.52	0.05-0.34	40-49	0-1.76	0-1.15	0-3.1	0-2.0
50-59	0.18-1.26	0.11-0.81	0.09-0.61	0.05-0.39	50-59	0-2.08	0-1.32	0-3.7	0-2.3
60-69	0.17-1.25	0.12-0.84	0.08-0.61	0.06-0.41	60-69	0-2.05	0-1.39	0-3.6	0-2.5
70-79	0.18-1.30	0.13-0.91	0.09-0.63	0.06-0.44	70-79	0-2.14	0-1.50	0-3.8	0-2.7
>80	0.22-1.60	0.14-1.03	0.11-0.78	0.07-0.50	>80	0-2.63	0-1.70	0-4.7	0-3.0

Nickel	µmol/mol creatinine		µg/g creatinine		Selenium	mmol/mol creatinine		mg/g creatinine	
	Age	Female	Male	Female		Male	Age	Female	Male
0-11	0-7.1	0-6.8	0-3.7	0-3.5	0-11	29-136	29-129	21-95	20-90
12-19	0-4.3	0-4.2	0-2.2	0-2.2	12-19	18-83	18-80	13-58	12-56
20-29	0-4.9	0-3.7	0-2.5	0-1.9	20-29	21-93	16-71	14-65	11-50
30-39	0-5.9	0-4.4	0-3.1	0-2.3	30-39	25-113	18-83	17-79	13-58
40-49	0-7.0	0-4.6	0-3.6	0-2.4	40-49	30-134	19-88	21-94	14-61
50-59	0-8.3	0-5.3	0-4.3	0-2.7	50-59	35-158	22-101	25-111	16-70
60-69	0-8.2	0-5.5	0-4.2	0-2.9	60-69	35-156	23-106	24-109	16-74
70-79	0-8.5	0-6.0	0-4.4	0-3.1	70-79	36-163	25-114	25-114	18-80
>80	0-10.5	0-6.8	0-5.4	0-3.5	>80	44-200	29-129	31-140	20-90

Urine Trace Elements - Age and Sex dependent reference ranges:

Silver	mmol/mol creatinine		mg/g creatinine		Thallium	mmol/mol creatinine		mg/g creatinine	
	Age	Female	Male	Female		Male	Age	Female	Male
0-11	0-55.2	0-52.7	0-52.6	0-50.3	0-11	0-233	0-222	0-421	0-402
12-19	0-33.6	0-32.6	0-32.0	0-31.1	12-19	0-142	0-138	0-256	0-249
20-29	0-38.0	0-29.0	0-36.2	0-27.6	20-29	0-160	0-122	0-290	0-221
30-39	0-45.9	0-33.8	0-43.7	0-32.3	30-39	0-194	0-143	0-350	0-258
40-49	0-54.5	0-35.7	0-52.0	0-34.0	40-49	0-230	0-151	0-416	0-272
50-59	0-64.4	0-41.0	0-61.4	0-39.1	50-59	0-272	0-173	0-491	0-313
60-69	0-63.5	0-42.9	0-60.5	0-40.9	60-69	0-268	0-181	0-484	0-327
70-79	0-66.2	0-46.4	0-63.1	0-44.2	70-79	0-280	0-196	0-505	0-354
>80	0-81.3	0-52.7	0-77.5	0-50.3	>80	0-343	0-222	0-620	0-402

Vanadium	µmol/mol creatinine		µg/g creatinine	
	Age	Female	Male	Female
0-11	29-280	29-268	14-126	13-121
12-19	18-171	18-166	8-77	8-75
20-29	21-193	16-147	9-87	7-66
30-39	25-233	19-172	11-105	8-77
40-49	30-277	20-181	14-125	9-82
50-59	35-327	23-208	16-147	10-94
60-69	35-323	24-218	16-145	11-98
70-79	36-337	26-236	16-152	11-106
>80	45-413	29-268	20-186	13-121

Creatinine reference ranges used for determination of Random Urine Trace Element reference values:

Age	mmol/L				mg/L			
	Female		Male		Female		Male	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
0-11	2.0-14.7	8.4	3.5-15.0	8.8	226-1663	950	396-1697	995
12-19	3.6-25.6	13.8	4.4-25.4	14.2	407-2896	1561	498-2873	1606
20-29	1.9-23.1	12.2	4.8-27.8	16	215-2613	1380	543-3145	1810
30-39	1.2-21.4	10.1	2.5-24.6	13.7	136-2421	1143	283-2783	1550
40-49	0.8-18.2	8.5	2.4-23.7	13	90-2059	962	271-2681	1471
50-59	1.1-15.3	7.2	2.2-21.3	11.3	124-1731	814	249-2409	1278
60-69	1.2-15.5	7.3	2.7-19.9	10.8	136-1753	826	305-2251	1222
70-79	1.3-15.4	7	2.8-18.5	10	147-1742	792	317-2093	1131
>80	0.9-10.6	5.7	2.3-15.7	8.8	102-1199	645	260-1776	995

Creatinine reference ranges reported with 24h Urine Trace Elements:

	mmol/L	mmol/d
Male	3.5 - 25.0	8.6 - 19.4
Female	2.6 - 20.0	6.3 - 13.4