

## Supplemental

**Summary:** The following tables describe toenail metal levels stratified by sources from consumption, correlation between different metal levels (e.g., Pb-As), or toenail metal levels stratified by smoking status.

Table 1. Average toenail Mn, As, and Hg levels (log values) from first visit with toenail metal data stratified by Mn in supplements, consumption of whole grains, and frequency of consumption of canned tuna.

	Toenail Metal	n	Mean	SD	Median	IQR
<b>No Mn supplements</b>	Mn	759	-0.549	0.442	-0.573	0.575
<b>Taking Mn supplements<sup>1</sup></b>	Mn	97	-0.467	0.357	-0.458	0.457
<b>Reported no consumption of whole grains</b>	Mn	724	-0.559	0.444	-0.583	0.576
<b>Reported consumption of whole grains<sup>2</sup></b>	Mn	347	-0.454	0.420	-0.476	0.577
<b>Reported no consumption of whole grains</b>	As	765	-1.108	0.316	-1.150	0.361
<b>Reported consumption of whole grains<sup>3</sup></b>	As	347	-1.048	0.261	-1.068	0.331
<b>Canned tuna consumption 1/week or less</b>	Hg	670	-0.631	0.407	-0.630	0.558
<b>Canned tuna consumption &gt;1/week<sup>4</sup></b>	Hg	98	-0.467	0.300	-0.449	0.432

n= first visits with toenail metal data and consumption status. The first visit an individual reported not having Mn supplements and having toenail Mn data is counted as one out of the 759. The first visit an individual reported having Mn supplements and having toenail Mn data is counted as one out of the 97. Some individuals contributed to both consumption groups.

SD= standard deviation

IQR= interquartile range

Student's t-test of means of toenail metal between consumption groups, two-sided, p-values:

<sup>1</sup>p=0.04

<sup>2</sup>p<0.001

<sup>3</sup>p<0.001

<sup>4</sup>p<0.001

Table 2. Correlations between metal measurements at first visit with donated toenails, 1992 to 2014 (top: Spearman's rho, middle: p-value, bottom: number of participants)

	<b>Pb</b>	<b>As</b>	<b>Cd</b>	<b>Mn</b>	<b>Hg</b>	<b>Blood Pb</b>
<b>Pb</b>	1	0.40	0.55	0.46	-0.03	0.31
		<.0001	<.0001	<.0001	0.395	<.0001
	813	791	812	792	678	749
<b>As</b>		1	0.27	0.54	0.08	0.10
			<.0001	<.0001	0.045	0.0056
		815	790	791	656	751
<b>Cd</b>			1	0.39	0.02	0.17
				<.0001	0.653	<.0001
			812	791	678	749
<b>Mn</b>				1	-0.05	0.04
					0.186	0.263
				792	657	728
<b>Hg</b>					1	-0.03
						0.398
					678	632

Table 3. Number of participants and median (IQR) metal concentration by order of donated toenail sample<sup>1</sup>, 1992 to 2014.

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Lead, n</b>	790	490	302	170	55	11
<b>%</b>	100.0	62.0	38.2	21.5	7.0	1.4
<b>Median, µg/g</b>	0.323	0.261	0.242	0.192	0.184	0.116
<b>IQR</b>	0.541	0.475	0.406	0.414	0.301	0.171
<b>Arsenic, n</b>	804	511	304	176	58	13
<b>%</b>	100.0	63.6	37.8	21.9	7.2	1.6
<b>Median, µg/g</b>	0.071	0.077	0.075	0.071	0.069	0.054
<b>IQR</b>	0.063	0.060	0.052	0.060	0.051	0.019
<b>Cadmium, n</b>	789	490	302	169	52	10
<b>%</b>	100.0	62.1	38.3	21.4	6.6	1.3
<b>Median, µg/g</b>	0.018	0.014	0.012	0.012	0.011	0.010
<b>IQR</b>	0.033	0.021	0.019	0.019	0.015	0.024
<b>Manganese, n</b>	766	478	290	167	47	9
<b>%</b>	100.0	62.4	37.9	21.8	6.1	1.2
<b>Median, µg/g</b>	0.270	0.283	0.281	0.248	0.257	0.205
<b>IQR</b>	0.398	0.398	0.324	0.397	0.423	0.089
<b>Mercury, n</b>	711	362	145	42	5	1
<b>%</b>	100.0	50.9	20.4	5.9	0.7	0.1
<b>Median, µg/g</b>	0.252	0.192	0.161	0.155	0.156	0.165
<b>IQR</b>	0.339	0.252	0.191	0.123	0.068	0.000

<sup>1</sup>Not all visits had toenail samples. Order of samples donated (1=first, 2=second, etc.) utilized to standardize table.

Table 4. Number of subjects and median toenail lead levels ordered by donated toenail sample<sup>1</sup> and stratified by smoking status, 1992 to 2014

	1	2	3	4	5	6
All (n)	790	490	302	170	55	11
%	100	62.0	38.2	21.5	7.0	1.4
Median (ug/g)	0.323	0.261	0.242	0.192	0.184	0.116
Never Smokers (n)	244	157	95	56	13	5
%	100	64.3	38.9	23.0	5.3	2.0
Median (ug/g)	0.318	0.262	0.296	0.276	0.232	0.060
Former Smokers (n)	509	316	193	106	39	6
%	100	62.1	37.9	20.8	7.7	1.2
Median (ug/g)	0.341	0.262	0.216	0.180	0.159	0.141
Current Smokers (n)	35	17	13	8	3	0
%	100	48.6	37.1	22.9	8.6	0.0
Median (ug/g)	0.300	0.223	0.231	0.070	0.073	—

<sup>1</sup>Not all visits had toenail samples. Order of samples donated (1=first, 2=second, etc.) utilized to standardize table.

Table 5. Number of subjects and median toenail arsenic levels ordered by donated toenail sample<sup>1</sup> and stratified by smoking status, 1992 to 2014

	1	2	3	4	5	6
All (n)	804	511	304	176	58	13
%	100.0	63.6	37.8	21.9	7.2	1.6
Median (ug/g)	0.071	0.077	0.075	0.071	0.069	0.054
Never Smokers (n)	251	158	98	60	16	6
%	100.0	62.9	39.0	23.9	6.4	2.4
Median (ug/g)	0.067	0.074	0.076	0.070	0.081	0.056
Former Smokers (n)	518	335	191	107	39	7
%	100.0	64.7	36.9	20.7	7.5	1.4
Median (ug/g)	0.072	0.080	0.075	0.070	0.069	0.053
Current Smokers (n)	33	18	14	9	3	0
%	100.0	54.5	42.4	27.3	9.1	0.0
Median (ug/g)	0.068	0.070	0.097	0.078	0.067	—

<sup>1</sup>Not all visits had toenail samples. Order of samples donated (1=first, 2=second, etc.) utilized to standardize table.

Table 6. Number of subjects and median toenail cadmium ordered by donated toenail sample<sup>1</sup> and stratified by smoking status, 1992 to 2014

	1	2	3	4	5	6
All (n)	789	490	302	169	52	10
%	100.0	62.1	38.3	21.4	6.6	1.3
Median (ug/g)	0.018	0.014	0.012	0.012	0.011	0.010
Never Smokers (n)	244	157	95	55	12	4
%	100.0	64.3	38.9	22.5	4.9	1.6
Median (ug/g)	0.018	0.013	0.013	0.011	0.016	0.022
Former Smokers (n)	509	316	193	106	37	6
%	100.0	62.1	37.9	20.8	7.3	1.2
Median (ug/g)	0.018	0.014	0.011	0.012	0.011	0.008
Current Smokers (n)	35	17	13	8	3	0
%	100.0	48.6	37.1	22.9	8.6	0.0
Median (ug/g)	0.016	0.017	0.015	0.015	0.023	—

<sup>1</sup>Not all visits had toenail samples. Order of samples donated (1=first, 2=second, etc.) utilized to standardize table.

Table 7. Number of subjects and median toenail manganese levels ordered by donated toenail sample<sup>1</sup> and stratified by smoking status, 1992 to 2014

	1	2	3	4	5	6
All (n)	766	478	290	167	47	9
%	100.0	62.4	37.9	21.8	6.1	1.2
Median (ug/g)	0.270	0.283	0.281	0.248	0.257	0.205
Never Smokers (n)	239	153	92	55	13	4
%	100.0	64.0	38.5	23.0	5.4	1.7
Median (ug/g)	0.244	0.281	0.276	0.320	0.342	0.278
Former Smokers (n)	495	308	184	104	32	5
%	100.0	62.2	37.2	21.0	6.5	1.0
Median (ug/g)	0.280	0.290	0.280	0.233	0.226	0.169
Current Smokers (n)	30	17	13	8	2	0
%	100.0	56.7	43.3	26.7	6.7	0.0
Median (ug/g)	0.374	0.278	0.335	0.307	1.266	—

<sup>1</sup>Not all visits had toenail samples. Order of samples donated (1=first, 2=second, etc.) utilized to standardize table.

Table 8. Number of subjects and median toenail mercury levels ordered by donated toenail sample<sup>1</sup> and stratified by smoking status, 1992 to 2014

	1	2	3	4	5	6
All (n)	711	362	145	42	5	1
%	100.0	50.9	20.4	5.9	0.7	0.1
Median (ug/g)	0.252	0.192	0.161	0.155	0.156	0.165
Never Smokers (n)	218	109	49	10	2	0
%	100.0	50.0	22.5	4.6	0.9	0.0
Median (ug/g)	0.214	0.163	0.146	0.120	0.401	—
Former Smokers (n)	459	239	88	29	2	1
%	100.0	52.1	19.2	6.3	0.4	0.2
Median (ug/g)	0.285	0.203	0.177	0.161	0.185	0.165
Current Smokers (n)	34	13	8	3	1	0
%	100.0	38.2	23.5	8.8	2.9	0.0
Median (ug/g)	0.189	0.103	0.134	0.146	0.147	—

<sup>1</sup>Not all visits had toenail samples. Order of samples donated (1=first, 2=second, etc.) utilized to standardize table.

Table 9. Number of subjects and median blood lead levels ordered by donated toenail sample<sup>1</sup> and stratified by smoking status, 1992 to 2008

	1	2	3	4	5
All (n)	1256	1012	728	389	78
%	100.0	80.6	58.0	31.0	6.2
Median (ug/dL)	5.00	4.00	4.00	3.00	3.00
Never Smokers (n)	377	301	227	121	32
%	100.0	79.8	60.2	32.1	8.5
Median (ug/dL)	5.00	4.00	3.00	3.00	3.00
Former Smokers (n)	779	650	468	253	42
%	100.0	83.4	60.1	32.5	5.4
Median (ug/dL)	5.00	4.00	4.00	3.00	3.00
Current Smokers (n)	100	61	33	15	4
%	100.0	61.0	33.0	15.0	4.0
Median (ug/dL)	6.00	5.00	5.00	3.00	3.00

<sup>1</sup>Not all visits had toenail samples. Order of samples donated (1=first, 2=second, etc.) utilized to standardize table.