

Supplemental Material

The association of bone, fingernail and blood manganese with cognitive and olfactory function

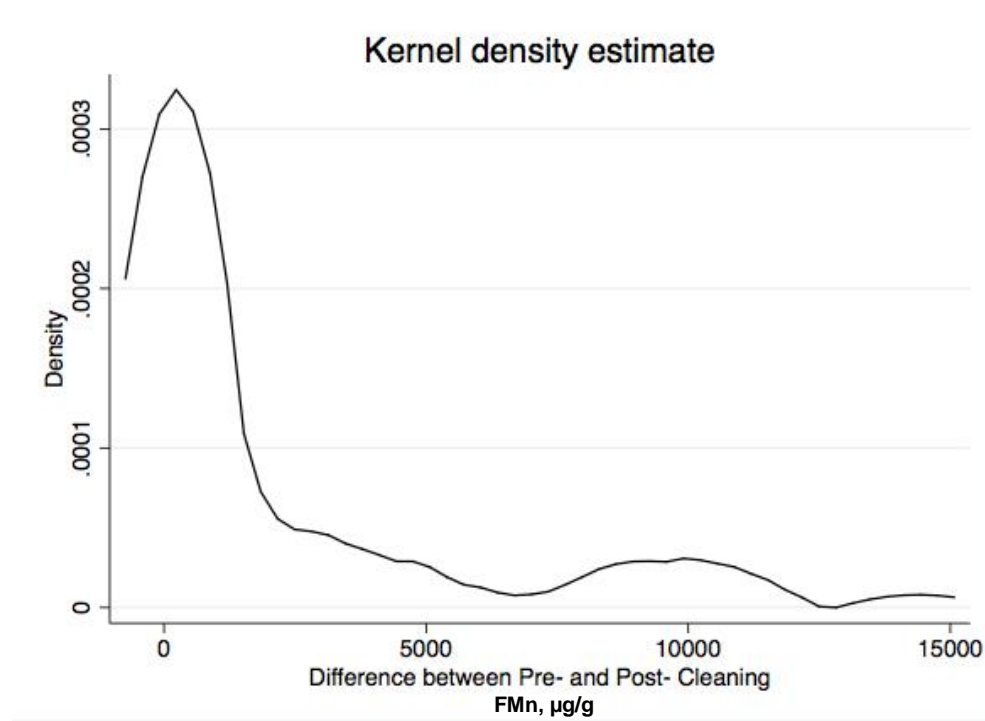
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Supplementary Figure 1. Kernel density plot of the difference in fingernail manganese concentration pre-and post- cleaning.



Supplementary Table 1. β (95% confidence interval) from adjusted linear regression models comparing natural log transformed manganese biomarkers with cognitive and olfactory test scores, excluding values with a large change in FMn pre and post cleaning

Outcome	Blood Manganese	Fingernail Manganese	Bone Manganese
Animal Naming ^a	0.65 (-4.55, 5.85)	-0.46 (-1.45, 0.53)	-0.94 (-2.61, 0.72)
Fruit Naming ^a	-1.01 (-4.99, 2.97)	-0.18 (-0.98, 0.61)	-0.18 (-1.48, 1.11)
Average AVLT ^a	-1.34 (-3.29, 0.60)	-0.44 (-0.80, -0.07)	-0.54 (-1.16, 0.08)
Difference AVLT ^a	-0.63 (-2.98, 1.73)	-0.44 (-0.89, 0.02)	-0.37 (-1.13, 0.39)
AVLT Trial 6 ^a	-0.77 (-3.04, 1.49)	-0.08 (-0.55, 0.39)	-0.15 (-0.89, 0.58)
AVLT Trial 6 Intrusions ^a	0.18 (-0.69, 1.05)	0.06 (-0.12, 0.23)	0.09 (-0.19, 0.37)
AVLT Trial 7 ^a	-1.45 (-5.04, 2.13)	-0.57 (-1.26, 0.12)	-0.37 (-1.53, 0.79)
AVLT Trial 7 Intrusions ^a	0.42 (-0.44, 1.28)	-0.01 (-0.19, 0.16)	-0.22 (-0.50, 0.05)
UPSIT-TC ^b	2.53 (-3.69, 8.74)	-0.17 (-1.35, 1.02)	-1.35 (-3.43, 0.72)

^a N = 53, except for fingernail manganese models, where N=48. Models adjusted for age (continuous), years of completed education (continuous), and current factory of employment (ferroalloy/manufacturing); ^b N = 51, except for fingernail manganese models, where N=46. Model adjusted for age (continuous), years of completed education (continuous), and current factory of employment (ferroalloy/manufacturing) and current smoking status (yes/no). AVLT = World Health Organization/University of California Los Angeles Auditory Verbal Learning Test; UPSIT-TC = University of Pennsylvania Smell Identification Test – Traditional Chinese

Supplementary Table 2. β (95% confidence interval) from adjusted linear regression models comparing tertiles of manganese biomarkers with cognitive and olfactory test scores, excluding values with a large change in FMn pre and post cleaning

Outcome	Blood Manganese		Fingernail Manganese		Bone Manganese	
	Tertile 2, 12.4 to 15.3 $\mu\text{g/L}$	Tertile 3, $\geq 15.5 \mu\text{g/L}$	Tertile 2, 2.2 to 27.7 $\mu\text{g/g}$	Tertile 3, $\geq 32.6 \mu\text{g/g}$	Tertile 2, 0.7 to 5.1 $\mu\text{g/g}$	Tertile 3, $\geq 5.2 \mu\text{g/g}$
Animal Naming ^a	0.66 (-2.41, 3.72)	-0.74 (-3.88, 2.40)	-1.91 (-5.58, 1.76)	-2.59 (-7.69, 2.50)	-1.62 (-4.47, 1.22)	-1.38 (-4.48, 1.72)
Fruit Naming ^a	1.82 (-0.38, 4.02)	-1.41 (-3.67, 0.84)	-2.26 (-5.13, 0.60)	-3.19 (-7.18, 0.79)	-0.12 (-2.34, 2.09)	-1.20 (-3.61, 1.21)
Average AVLT ^a	-0.35 (-1.50, 0.79)	-1.00 (-2.16, 0.17)	-0.65 (-2.04, 0.73)	-1.70 (-3.62, 0.22)	-0.13 (-1.20, 0.95)	-0.88 (-2.04, 0.29)
Difference AVLT ^a	-0.46 (-1.85, 0.94)	-0.48 (-1.91, 0.94)	0.12 (-1.64, 1.88)	-0.20 (-2.64, 2.25)	-0.20 (-1.49, 1.09)	-0.87 (-2.28, 0.53)
AVLT Trial 6 ^a	0.69 (-0.57, 1.96)	-1.08 (-2.37, 0.21)	0.94 (-0.77, 2.66)	0.54 (-1.84, 2.93)	-1.25 (-2.46, -0.04)	-0.32 (-1.64, 0.99)
AVLT Trial 6 Intrusions ^a	-0.33 (-0.83, 0.18)	0.07 (-0.44, 0.59)	0.14 (-0.52, 0.79)	0.36 (-0.55, 1.27)	0.45 (-0.009, 0.91)	0.48 (-0.02, 0.98)
AVLT Trial 7 ^a	0.57 (-1.54, 2.69)	-0.74 (-2.90, 1.42)	-1.84 (-4.42, 0.73)	-2.38 (-5.96, 1.20)	-0.61 (-2.61, 1.39)	-0.45 (-2.63, 1.72)
AVLT Trial 7 Intrusions ^a	-0.27 (-0.78, 0.24)	-0.05 (-0.57, 0.47)	0.47 (-0.16, 1.10)	-0.05 (-0.93, 0.83)	-0.09 (-0.57, 0.39)	-0.19 (-0.71, 0.34)
UPSIT-TC ^b	0.11 (-3.70, 3.93)	1.71 (-2.04, 5.46)	1.93 (-2.29, 6.15)	-0.52 (-6.51, 5.47)	-1.06 (-4.53, 2.42)	-3.04 (-6.83, 0.74)

^a N = 53, except for fingernail manganese models, where N=48. Models adjusted for age (continuous), years of completed education (continuous), and current factory of employment (ferroalloy/manufacturing); ^b N = 51, except for fingernail manganese models, where N=46. Model adjusted for age (continuous), years of completed education (continuous), and current factory of employment (ferroalloy/manufacturing) and current smoking status (yes/no). AVLT = World Health Organization/University of California Los Angeles Auditory Verbal Learning Test; UPSIT-TC = University of Pennsylvania Smell Identification Test – Traditional Chinese