Predicting dietborne metal toxicity from metal influxes

Marie-Noële Croteau and Samuel N. Luoma*

U.S. Geological Survey, 345 Middlefield Road, MS465, Menlo Park, CA 94025, USA

**Corresponding author phone: 650-329-4424; fax 650-329-5590;*
email: mcroteau@usgs.gov

4 pages (2 Tables and 4 equations)

Table S1. Nominal dissolved tracer concentrations (µg l^{-1}) used to label *N. palea* offered as food to *L. stagnalis*

Experiment	^{65}Cu	^{106}Cd	^{62}Ni
1	10	1.0	2.0
1	100	10	20
1	250	25	50
1	500	50	100
1	1000	100	200
2	0	2.0	4.0
2	0	10	20
2	0	20	40
2	0	50	100
2	0	100	200
2	0	200	400
3	20	0	0
3	100	0	0
3	200	0	0
3	400	0	0
3	800	0	0
3	1200	0	0

Calculation of accumulated ^{106}Cd concentrations. The relative abundance of ^{106}Cd is determined using the net signal intensities of each Cd isotope in the standards used to calibrate the ICP-MS. For example,

$$p^{106} = \text{Intensity}\left(\frac{^{106}Cd}{^{106}Cd + {}^{108}Cd + {}^{110}Cd + {}^{111}Cd + {}^{112}Cd + {}^{113}Cd + {}^{114}Cd}\right)_{\text{Standard}} \quad (1)$$

Concentrations of ^{106}Cd in the experimental organisms ($[^{106}Cd]_{\hat{e}}$) are calculated as the product of p^{106} and the total Cd concentrations inferred by the ICP-MS software from tracer intensity ($[T^{106}Cd]$):

$$[^{106}Cd]_{\hat{e}} = p^{106} \times [T^{106}Cd] \quad (2)$$

Total Cd concentrations inferred from the intensity of the most abundant isotope are then used to derive the original load of tracer ($[^{106}Cd]^{0}_{\hat{e}}$) that occurred in each sample in the absence of a spike, e.g.,

$$[^{106}Cd]^{0}_{\hat{e}} = p^{106} \times [T^{114}Cd] \quad (3)$$

Net ^{106}Cd uptake ($\Delta[^{106}Cd]_{\hat{e}}$) is $[^{106}C]_{\hat{e}}$ as derived from the total experimental Cd inferred from ^{106}Cd signal (equation 2) minus the pre-existing load of ^{106}Cd ($[^{106}Cd]^{0}_{\hat{e}}$) from equation 3,

$$\Delta[^{106}Cd]_{\hat{e}} = [^{106}Cd]_{\hat{e}} - [^{106}Cd]^{0}_{\hat{e}} \quad (4)$$

TABLE S2. Food IR (g g^{-1} d^{-1} ± 95% C.I.) determined by mass-balance calculations for each tracer

Metal exposure (nmol g^{-1})	**^{65}Cu**	**^{106}Cd**	**^{62}Ni**
Cu + Cd + Ni			
1373±240	0.136±0.039 (6)	0.189±0.039 (8)	0.050±0.024 (7)
10718±354	0.118±0.041 (8)	0.115±0.040 (8)	0.058±0.022 (8)
20324±922	0.097±0.027 (8)	0.087±0.022 (8)	0.047±0.015 (8)
32946±7154	0.078±0.023 (8)	0.050±0.015 (8)	0.020±0.007 (8)
59923±6813	0.045±0.015 (7)	0.015±0.003 (7)	0.004±0.002 (7)
Cd + Ni			
263±23		0.152±0.070 (10)	0.158±0.069 (9)
1449±69		0.168±0.059 (10)	0.131±0.042 (10)
2369±434		0.222±0.096 (9)	0.164±0.076 (9)
4940±622		0.236±0.084 (10)	0.158±0.055 (10)
8073±632		0.256±0.088 (10)	0.148±0.041 (10)
11339±399		0.303±0.100 (10)	0.208±0.075 (10)
Cu only			
1420±83	0.091±0.037 (8)		
9808±744	0.138±0.073 (7)		
20523±1052	0.111±0.025 (10)		
33847±757	0.068±0.019 (8)		
83848±6977	0.017±0.004 (10)		
117057±14377	0.008±0.003 (10)		