

Supporting Information

Perchlorate exposure and dose estimates in infants

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Contents:

- Pages S1-S6
- Study Enrollment criteria
- Table S1. Precision of the method based on the analysis of quality control material at two different levels
- Table S2. Multivariate correlation coefficients for perchlorate, thiocyanate, nitrate and iodide in urine
- Table S3. Distribution of dose estimates by feeding group
- References

Enrollment Criteria

We analyzed residual urine samples as part of the soy estrogen and development (SEAD) study (1). This cross-sectional, semi-longitudinal pilot study involved collecting samples from infants who were enrolled and examined at ages ranging from one day to 12 months. The full SEAD study had 31 examination age intervals (birth - 48 hr; weekly for 6 months and then monthly to 1 year of age). Each of these examination age intervals included six boys and six girls. Eligibility requirements for children included: born between 37 week's and 41 week's gestation; birth weight between 2500 and 4500 g; and free of any major illness or birth defects that might interfere with growth, development, or feeding. In addition, males were required to have palpable testes. To prevent the pilot from consisting of nearly all breast-fed newborns and all cow milk formula-fed older children, we required that one-third of the children seen at each age interval be exclusively fed breast milk, cow milk formula, or soy formula. As we anticipated that older infants who had never had anything but soy formula or breast milk would be rare, we allowed predetermined, arbitrary, but relatively small amounts of other feedings that would allow an older child to remain in a category. Additionally, we did not exclude infants consuming "solid food".

Analytical Precision

Each batch of unknown samples was bracketed by aliquots of two characterized pools of quality control materials. This data was used to assess method precision as previously described (2). Reported results met the precision specifications of the quality control/quality assurance program of the Division of Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention (similar to rules outlined by Westgard [3]). The

resulting precision data are shown in Table S1, and indicate excellent precision of the method for all analytes (coefficients of variation < 5%).

Table S1. Precision of the method based on the analysis of quality control material at two different levels.

Quality Control Low Level					
Analyte	Mean (µg/L)	Standard Deviation among runs	Standard Deviation within runs	Standard Deviation Overall	% CV
Perchlorate	3.20	0.109	0.126	0.141	4.4
Nitrate	33459	1052	1021	1276	3.8
Thiocyanate	1927	73.6	46.1	80.5	4.2
Iodide	93.3	1.43	1.71	1.88	2.0
Quality Control High Level					
Analyte	Mean (µg/L)	Standard Deviation among runs	Standard Deviation within runs	Standard Deviation Overall	% CV
Perchlorate	72.5	2.16	2.34	2.72	3.8
Nitrate	95332	1452	1307	1721	1.8
Thiocyanate	3532	143	94	157	4.5
Iodide	196	3.41	2.20	3.75	1.9

Analyte Correlations

We evaluated correlations among perchlorate, thiocyanate, nitrate and iodide in urine using using SAS JMP v8 (REML method). Table S2 contains the multivariate correlation coefficients for perchlorate, thiocyanate, nitrate and iodide. Perchlorate and iodide levels were positively correlated ($r=0.55$) in urine samples. The positive correlation of these two anions in infant urine samples likely results from positively correlated levels in the diet. One explanation is that the same food crop processes that concentrate perchlorate (e.g. transpiration in edible leaves) may also concentrate

iodine. The positive correlation of perchlorate and iodide in infant urine samples provides some evidence that perchlorate was not out-competing iodide for transport during lactation for the maternal/infant pairs in this study.

Table S2. Multivariate correlation coefficients^a for perchlorate, thiocyanate, nitrate and iodide in urine.

	Perchlorate	Thiocyanate	Nitrate	Iodide
Perchlorate	1.000	0.3467	0.1251	0.5478
Thiocyanate	0.3467	1.000	0.0025	0.2667
Nitrate	0.1251	0.0025	1.000	0.3352
Iodide	0.5478	0.2667	0.3352	1.000

^aCorrelations coefficients are estimated by REML method using SAS JMP v8.

Perchlorate Dose Estimates

To provide toxicological perspective on our data, we estimated perchlorate dose on the basis of measured spot urine perchlorate and creatinine (4). Estimated perchlorate exposure doses for the infants we studied are presented in Table S3.

Table S3. Estimated perchlorate dose ($\mu\text{g}/\text{Kd}\text{-day}$) for 205 urine samples collected from 92 infants at ages 1-377 days.

	All Infants	Feeding Groups		
	Perchlorate dose ($\mu\text{g}/\text{kg}/\text{day}$)	Breast Milk	Cow milk formula	Soy Formula
N^a	205	91	51	63
Mean	0.255	0.420	0.208	0.065
Geo Mean	0.092	0.220	0.103	0.027
Minimum	0.002	0.002	0.002	0.002
10th percentile	0.005	0.020	0.008	0.003
25th percentile	0.039	0.189	0.079	0.006
Median	0.160	0.315	0.160	0.039
75th percentile	0.328	0.564	0.242	0.095
90th percentile	0.658	0.988	0.545	0.202
Maximum	1.843	1.843	1.397	0.352

^a Number of urine samples

References

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