

Statement on potential risks from cadmium in the diet of infants aged 0 to 12 months and children aged 1 to 5 years

# **Risk characterisation - Statement on potential risks from cadmium in the diet of infants**

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74. COT concluded that the EFSA tolerable weekly intake value (TWI) of 2.5 mg/kg bw/week was an acceptable value to use in risk assessment following EFSA's rigorous statistical review of the derivation of its HBGV compared with that of JECFA.

## **Breast milk**

75. Cadmium intake in average and high level exclusively breast-fed UK infants from 0 to 6 months of age is shown in Table 18 below. Values range from 11 – 68% of the EFSA TWI of 2.5 mg/kg bw/week.

Table18. Risk characterisation of cadmium intake from exclusive breastfeeding in 0 to 6-month old infants, with breast milk.

**Percentage of EFSA TWI (2.5 µg/kg bw/week).**

<b>Cadmium concentration (µg/L)</b>	<b>Average consumer (800 mL/day), 0 to 4 months</b>	<b>Average consumer (800 mL/day), 4 to 6 months</b>	<b>High consumer (1200 mL/day), 0 to 4 months</b>	<b>High consumer (1200 mL/day), 4 to 6 months</b>
Mean 0.4	15	11	23	17
Max 1.2	46	34	68	52

76. Intakes of cadmium for mean and 97.5<sup>th</sup> percentile breast milk consumers from infants of 4 to 18 months of age who are fed milk as only part of their diet are shown in Table 19 below. Mean and 97.5<sup>th</sup> percentile intakes of cadmium were 2.8 to 19 % of the EFSA TWI at 0.4 mg Cd/l and 8.4 to 56% at 1.2 mg Cd/l.

Table 19. Estimated cadmium intake in 4 to 18 month old infants from breast milk.

**Percentage of EFSA TWI (2.5 µg/kg bw/week).**

<b>Breast milk consumption</b>	<b>Age group (months), 4 to 6</b>	<b>Age group (months), 6 to 9</b>	<b>Age group (months), 9 to 12</b>	<b>Age group (months), 12 to 15</b>	<b>Age group (months), 15 to 18</b>
<b>Mean@0.4 mg Cd/l</b>	10	7.6	4.2	3.4	2.8

<b>97.5<sup>th</sup> percentile @0.4 mg Cd/l</b>	17	19	13	8.4	5.9
<b>Mean@1.2 mg Cd/l</b>	31	23	13	10	8.4
<b>97.5<sup>th</sup> percentile @1.2 mg Cd/l</b>	52	56	39	25	18

## Infant formulae and complementary foods

77. Cadmium intake estimates for 0 to 6 month olds fed on infant formula of different make-up are shown in Table 20 below. Average consumer intakes of cadmium were 0 to 62 % of the EFSA TWI. High level consumer intakes were from 0 to 92% of the EFSA TWI.

Table 20. Estimated dietary intake of cadmium from exclusive feeding on infant formulae for 0 to 6-month olds relative to HBGV.

### Percentage of EFSA TWI (2.5 µg/kg bw/week)

<b>Infant Formula</b>	<b>0 to 4 months, Average consumer  (800 mL/day)</b>	<b>0 to 4 months, High level consumer  (1200 mL/day)</b>	<b>4 to 6 months, Average consumer  (800 mL/day)</b>	<b>4 to 6 months, High level consumer  (1200 mL/day)</b>
Ready-to-Feed <sup>a</sup>	0-8.4	0-11	0-5.6	0-8.4
Dry Powder <sup>b, c</sup>	17-22	25-34	14-17	20-25

Dry Powder <sup>c</sup> + TDS water of 1.2 µg/L <sup>d</sup>	53-62	84-92	42-45	64-70
Dry Powder <sup>c</sup> + median water of 0.04 µg/L <sup>d</sup>	20-25	28-36	17-20	22-28
Dry Powder <sup>c</sup> + 97.5 <sup>th</sup> percentile water of 0.4 µg/L <sup>d</sup>	31-36	45-53	28-31	34-39

78. Intakes of cadmium from infant formulae, commercial infant foods, and other foods, for 4 to 12-month olds are shown in Table 21. Mean total intakes were 34 to 78% µg/kg bw/day, and 97.5<sup>th</sup> percentile total intakes were 130 to 170 % for the EU TWI. Intakes of cadmium from exclusive consumption of soya-based infant formulae are 47% and 71% of the EU TWI for the mean and 97.5<sup>th</sup> percentile consumers respectively.

Table 21. Estimated Intake of cadmium from infant formulae, commercial infant foods and other foods for 4 to 12-month olds relative to HBGV.

**Percentage of TWI (2.5 µg/kg bw/week).**

<b>Food</b>	<b>4 to 6 Months</b>	<b>4 to 6 Months</b>	<b>6 to 9 Months</b>	<b>6 to 9 Months</b>	<b>9 to 12 Months</b>	<b>9 to 12 Months</b>
	<b>(n=116), Mean</b>	<b>(n=116), 97.5<sup>th</sup></b>	<b>(n=606), Mean</b>	<b>(n=606), 97.5<sup>th</sup></b>	<b>(n=686), Mean</b>	<b>(n=686), 97.5<sup>th</sup></b>
Infant formula	0.11-3.9	1.4-7.8	0.14-3.4	0.36-7.6	0.14-2.5	1.5-5.3
Commercial infant foods	15	64	22-23	81-84	21-22	90-92

Other foods	17	87	39	130	56	150
Total (excl. water)	34-36	130	62-64	150	76-78	170

## Children aged 12 to 18 months

### Intake estimates based on the Infant Metals Survey

79. For the EU TWI, the ranges of total mean and 97.5<sup>th</sup> percentile intakes (excluding water) to cadmium from infant formula, commercial infant foods and other foods were 73 to 79 and 150 to 160% respectively (Table 22).

Table 22. Estimated dietary intake of cadmium from infant formulae, commercial infant foods and other foods in children aged 12 to 18 months relative to HBGV.

### Percentage of EU TWI (2.5 µg/kg bw/week).

Food	12 to 15 Months	12 to 15 Months	15 to 18 Months	15 to 18 Months
	(n=670), Mean	(n=670), 97.5 <sup>th</sup>	(n=605), Mean	(n=605), 97.5 <sup>th</sup>
Infant formula	0 - 11	0-6	0.6	0-2.8
Commercial infant foods	11	59-62	5.6	39
Other Foods	62-64	150	67-70	150
Total (excl. water)	73-76	160	73-76	150

80. Table 23 refers to dietary intakes of Cd based on the Total Dietary Survey and illustrates that concurrent intake of UK water, whether at the highest

recorded median or highest 97.5<sup>th</sup> percentile Cd concentration (see Table 3) has no significant effect on the amount taken in with food. Relative to the EU TWI, mean intakes were 81 to 150% and 97.5<sup>th</sup> percentile intakes were 170 to 260%.

Table 23. Estimated dietary intake of cadmium based on the TDS data in children aged 12 to 18 months, relative to the HBGV, taking into account the contribution from of UK water containing the highest median and 97.5<sup>th</sup> percentile concentrations of cadmium.

**Percentage of the EU TWI (2.5 mg/kg bw/week).**

**Cadmium  
concentration in the  
water**

<b>12 to 15 Months (n=670), Mean</b>	<b>12 to 15 Months (n=670), 97.5<sup>th</sup></b>	<b>15 to 18 Months (n=605), Mean</b>	<b>15 to 18 Months (n=605), 97.5<sup>th</sup></b>	
0.04 µg/L <sup>a</sup>	81-140	170-260	90-150	170-250
0.4 µg/L <sup>b</sup>	81-140	170-260	90-150	170-250

Values rounded to 2 SF.

<sup>a</sup> Highest median concentration in UK drinking water. <sup>b</sup> Highest 97.5<sup>th</sup> percentile concentration in UK drinking water.

81. In general, the food groups making the highest contribution to cadmium exposure were miscellaneous cereals, bread and potatoes (FSA, 2016b), as shown in Table 24.

Table 24. Contribution to total dietary cadmium intake by the three food groups containing the highest levels of Cd based on TDS data.

### **Percentage of EU TWI (2.5 mg/kgbw/week).**

<b>Food Groups</b>	<b>12 to 15, Mean</b>	<b>12 to 15, 97.5th Percentile</b>	<b>1518, Mean</b>	<b>1518, 97.5th Percentile</b>
Bread	15	42	17	45
Miscellaneous Cereals	25	78	31	90
Potatoes	21	73	18	59
Total	58	193	67	193

### **Children aged 18 months to 5 years**

82. The total mean and 97.5<sup>th</sup> percentile intake values including water (calculated using the highest median and 97.5<sup>th</sup> percentile values in Table 3) were equal to those estimated for the total mean exposures excluding water (Table 22).

83. Table 25 refers to dietary intakes of Cd based on the Total Dietary Survey and illustrates that concurrent intake of UK water, whether at the highest recorded median or highest 97.5<sup>th</sup> percentile Cd concentration (see Table 3) has no significant effect on the amount taken in with food. Relative to the EU TWI, mean intakes were 90 to 170% and 97.5<sup>th</sup> percentile intakes were 150 to 260%.

Table 25. Estimated dietary intake of cadmium based on the TDS data in children aged 18 months to 5 years, relative to the HBGV, taking into account the contribution from of UK water containing the highest median and 97.5<sup>th</sup> percentile concentrations of cadmium.

### **Percentage of the EU TWI (2.5 mg/kg bw/week).**

<b>Cadmium concentration in water</b>	<b>18 to 24 Months (n=70), Mean</b>	<b>18 to 24 Months (n=70), 97.5<sup>th</sup></b>	<b>24 to 60 Months (n=70), Mean</b>	<b>24 to 60 Months (n=70), 97.5<sup>th</sup></b>
0.04 µg/L <sup>a</sup>	95-170	160-260	90-150	150-220
0.4 µg/L <sup>b</sup>	95-170	160-260	90-150	150-220

Values rounded to 2 SF.

a Highest median concentration in UK drinking water. b Highest 97.5<sup>th</sup> percentile concentration in UK drinking water.

84. As with the younger children, the food groups making the highest contribution to cadmium exposure in the TDS were miscellaneous cereals, bread and potatoes (FSA, 2016b), shown in Table 26

Table 26 Contribution to total dietary cadmium intake by the three food groups containing the highest levels of Cd based on TDS data.

**Percentage of EU TWI (2.5mg/kg bw/week).**

<b>Food Groups</b>	<b>12 to 15, Mean</b>	<b>12 to 15, 97.5th Percentile</b>	<b>1518, Mean</b>	<b>1518, 97.5th Percentile</b>
Bread	18	39	20	48
Miscellaneous Cereals	34	67	27	67
Potatoes	19	39	17	50
Total	70	146	64	162



## **Soya**

Using the EFSA default values of 800 and 1200 ml for exclusive consumption of infant formula for the 4 to 6 month age group, intake estimates for cadmium in soya formula would be 48% and 73% of the EU TWI for average and high level consumers, respectively before taking into account water used in reconstitution,

## **Dust**

Table 27 shows that the median Intakes from dust ingestion were at most 1.7% and the maximum intakes 7.8% of the EU TWI.

Table 27. Estimated cadmium intakes from dust in infants and young children aged 6 months to 5 years.

### **Percentage of EU TWI (2.5 mg/kg bw/week).**

<b>Cadmium concentration (mg/kg)</b>	<b>Age (months) 6 to 9</b>	<b>Age (months) 9 to 12</b>	<b>Age (months) 12 to 15</b>	<b>Age (months) 15 to 18</b>	<b>Age (months) 18 to 24</b>	<b>Age (months) 24 to 60</b>
1.1 (Median)	0.95	0.95	1.7	1.7	1.5	1.1
4.9 (Maximum)	4.8	4.2	7.8	7.3	7.0	5.0

## **Soil**

85. Intakes in UK infants aged 6 to 12 months and young children aged 1 to 5 years of cadmium in soil are given in Table 28.

86. Relative to the EU TWI, the highest median intake value for cadmium from soil was 0.64% and the highest 95<sup>th</sup> percentile value was 1.6%.

Table 28 Estimated cadmium intakes from soil in infants and young children aged 6 months to 5 years.

### **Percentage of EU TWI (2.5 µg/kg bw/week).**

<b>Cadmium concentration (mg/kg)</b>	<b>Age (months) 6 to 9</b>	<b>Age (months) 9 to 12</b>	<b>Age (months) 12 to 15</b>	<b>Age (months) 15 to 18</b>	<b>Age (months) 18 to 24</b>	<b>Age (months) 24 to 60</b>
0.5 (Median)	0.48	0.42	0.64	0.62	0.59	0.45
1.2 (95 <sup>th</sup> percentile)	1.1	1.1	1.6	1.5	1.4	1.0

## Air

87. Relative to the EU TWI, the highest median intake value for cadmium from the air was 0.25% and the highest maximum value was 3.6% (Table 29).

Table 29. Possible intakes to cadmium in infants and young children from air.

### Percentage of the EU TWI (2.5 mg/kg bw/week)

<b>Cadmium concentration (ng/m<sup>3</sup>)</b>	<b>Ages (months) 0 to 4</b>	<b>Ages (months) 4 to 6</b>	<b>Ages (months) 6 to 9</b>	<b>Ages (months) 9 to 12</b>	<b>Ages (months) 12 to 15</b>	<b>Ages (months) 15 to 18</b>	<b>Ages (months) 18 to 24</b>
(lowest median value)	0.0039	0.0031	0.0042	0.0036	0.0050	0.0048	0.0045
(highest median value)	0.20	0.18	0.20	0.18	0.25	0.24	0.22
(lowest maximum value)	0.0070	0.0062	0.0073	0.0067	0.0090	0.0084	0.0078

(highest  
maximum  
value)

2.8

2.5

2.8

2.7

3.6

3.4

3.1