

Memorandum

Date: November 21, 2022

Subject: Cadmium (Cd) in Roasted Organic Seaweed Snack

Re: CMS Case #645986, Task #678655, Private laboratory sample # 3824086

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As requested by OFS, DRDA evaluated the safety of exposure to Cd in Organic Roasted Seaweed Snack (seaweed snack). A sample of the seaweed snack was analyzed by a private laboratory, Certified Laboratories and found to contain 1.420 mg/kg ($\mu\text{g/g}$) Cd. Kanas City Laboratory reviewed the report from Certified Laboratory and found it “acceptable with borderline results.”

DRDA Conclusion

DRDA concludes that exposure to Cd from consumption of the seaweed snack is likely to be a health concern for children (MF 0-6 y), but not for the general population (MF 2+ y).

Consumption and Exposure Estimates

DRDA generally relies upon results of the National Health and Nutrition Examination Survey (NHANES), What We Eat In America (WWEIA) component for estimating dietary intakes of foods and for estimating contaminant exposures from intake of those foods. However, the number of WWEIA/NHANES respondents reporting dried seaweed consumption is too low to assure statistical reliability of estimates. Seaweed snacks generally are packaged as 5 g single servings, and DRDA generally estimates upper-level daily intake of seaweed snacks assuming consumption of one 5 g serving per day. The seaweed snack that is the subject of the current case is sold in 17 g packages, with a labeled serving size of 1/5 package, or 3.4 g. However, for consistency, DRDA

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estimated upper-level daily intake of the dried seaweed snacks to be 5 g/day, for both adults and children.

Estimated Cd exposures from consumption of the seaweed snack are shown in Table 1.

Table 1. Estimated exposure to Cd from consumption of seaweed snack.

Contaminant	Population	Contaminant Concentration (µg/g)	Estimated Upper-Level Chronic Consumption of Seaweed Snack ^a (g/kg bw/day)	Estimated Upper-Level Chronic Contaminant Exposure from Seaweed Snack ^b (µg/kg bw/day)
Cd	MF 0-6 y	1.420	0.31	0.44
	MF 2+ y		0.07	0.10

^a Estimated based on serving size of most single packages of seaweed snacks. Intakes were converted to g/kg bw/day using body weights of 75.4 kg for the general population and 16.1 kg for children (based on average body weights measured in NHANES 2017-2018).

^b Concentration in sample (µg/g) * upper-level consumption (g/kg bw/day) = estimated total exposure (µg/kg bw/day)

Safety Assessment

Cadmium (Cd)

Cd is an accumulative toxic element with a long biological half-life between 10 to 33 years in humans. Therefore, the toxicity of Cd generally results from chronic exposure. For the general population who are non-smokers, diet is the major source of Cd exposure. Chronic exposure to Cd in food may lead to its accumulation in the kidney (generally regarded as the most sensitive target for Cd toxicity), and this can cause renal tubular dysfunction and damage over time (WHO, 2011). EFSA has established a tolerable weekly intake (TWI) of 2.5 µg/kg bw/weekly for Cd, corresponding to **0.36 µg/kg bw/day** (EFSA, 2009). The TWI is based on a meta-analysis of human epidemiological studies assessing the relationship between urinary Cd and beta-2-microglobulin levels and a toxicological model to convert urinary Cd to dietary Cd exposure.

As shown in Table 1, regular consumption of the seaweed snack would result in Cd exposure for children (MF 0-6 y) of greater than 0.36 µg/kg bw/day, which is the EFSA TWI adjusted for daily exposure. Also shown in Table 1, regular consumption of the seaweed snack would result in Cd exposure for the general population (MF 2+ y) of less than 0.36 µg/kg bw/day. Therefore, Cd exposure from consumption of the seaweed snack is likely to be a health concern for children, but not for the general population.

References

European Food Safety Authority (EFSA) (2009). Cadmium in Food. Scientific Opinion of the Panel on Contaminants in the Food Chain. *EFSA Journal* 980, 1-139.

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Accessed 11/17/2022.