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Circulation of zinc and cadmium in the sea and land environment of west Japan

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The Hiroshima-Oyster has bearded the Setouchi local cuisine culture. Its commercial share expanded to all over Japan after the great earthquake of eastern Japan in 2011. In order to evaluate the sanitary environment around Hiroshima Bay area, we collected wild oysters (*Crassostrea gigas*) and mud from gulf of Hiroshima, Kurashiki and Kagoshima, and measured their zinc (Zn) and cadmium (Cd) in their meat, shell and the mud. The mud at the gulf of Hiroshima contained Zn and Cd with amounts of 188.0 and 0.53 mg/kg mg/kg, respectively. Concentration ratios of Zn in the oysters were higher as the concentrations of it in mud were lower. The concentration ratio of Zn in the shell/whole oyster (meat plus shell) was constant among the three groups with the value of 0.019. This finding made us available to estimate the Zn concentration ratio of the meat from that of the shell. The formula is $b=c \cdot a$, where b is concentration ratio in meat, c is constant (46.4) and a concentration ratio in shell. Concentration of Cd in the shell/whole oyster was constant among the three groups (0.26~0.42). For the monitoring of the cultivation environment of Hiroshima Bay area, the seawater temperature, salinity concentration and plankton amount were recorded weekly, while the content of moisture, protein, total lipid, minerals, Zn was measured monthly for mature and immature oysters. Measuring the concentration of Cd in shells and mud is very informative to estimate the amounts of metals we consume through seafood, vegetables and poultry, as the shell has been recycled for fertilizer of vegetables or food of poultry in Japan.

Figure 1. Concentration of zinc (Zn) and cadmium (Cd).

	Zn			Cd		
	Kurashiki	Hiroshima	Kagoshima	Kurashiki	Hiroshima	Kagoshima
mud	39.3 ± 9.2	166.0 ± 86.1	310.0 ± 103.6 *	0.13 ± 0.09	0.50 ± 0.18 *	1.43 ± 0.80 *
meat	354.8 ± 39.8	467.5 ± 48.3 *	721.0 ± 143.6 *	0.41 ± 0.05	0.25 ± 0.04	0.30 ± 0.04
shell	9.6 ± 3.4	8.9 ± 4.1	15.1 ± 9.5	0.16 ± 0.05	0.16 ± 0.08	0.20 ± 0.03

*: P<0.05 by t-test (when compared to Kurashiki).

Figure 2. Concentration ratio of zinc (Zn) and cadmium (Cd).

	Zn			Cd		
	Kurashiki	Hiroshima	Kagoshima	Kurashiki	Hiroshima	Kagoshima
mud	1	1	1	1	1	1
meat	9.30 ± 1.73	3.63 ± 2.10 **	2.58 ± 1.23 **	4.44 ± 4.10	0.70 ± 0.40	0.20 ± 0.10
shell	0.26 ± 0.11	0.07 ± 0.06 *	0.05 ± 0.03 *	1.93 ± 1.29	0.29 ± 0.06 *	0.16 ± 0.07
meat plus shell	9.56 ± 1.72	3.71 ± 2.16	2.61 ± 1.23	6.37 ± 5.92	0.99 ± 0.36	0.36 ± 0.20
shell/meat plus shell	0.03 ± 0.01	0.02 ± 0.01	0.02 ± 0.02	0.25 ± 0.06	0.30 ± 0.15	0.46 ± 0.04

*: P<0.05 by t-test (when compared to Kurashiki); **: P<0.01 by t-test (when compared to Kurashiki).

Figure-1: Concentration of zinc (Zn) and cadmium (Cd); concentration ratio of zinc (Zn) and cadmium (Cd)

Recent Publications

1. Harada T, Nitta Y, et al. (2017) Epidemiological Study of Eating Habit of Middle-Aged and Elderly Women: Mihara and Hiroshima Questionnaire Study. *International Medical Journal*; 24: 214 -218.
2. Nitta Y, et al. (2007) Intestinal tumorigenicity of mice carrying hemizygous Pax6, Pax6(Sey-4H). *Exp. Anim.*; 56: 289-294.

References

1. Aoi S, et al. (2016) Association of Changes in Neck Circumference with Cardiometabolic Risk in Postmenopausal Healthy Women. *J. Atheroscler Thromb.*; 23: 728-36.
2. Aoi S, et al. (2014) Neck circumference has possibility as a predictor for metabolic syndrome in postmenopausal women. *Hiroshima J. Med. Sci.*; 63: 27-32.

Biography

Yumiko Nitta has completed her PhD from Hiroshima University. She started her occupation as the Research Assistance at Research Institute of Radiation Biology and Medicine in Hiroshima University, where she examined effects of radiations on mammalian genome. Then, she obtained the position of Associate Professor at Suzugamine Women's College, where she analyzed data of human health monitoring. Presently she is a Professor at the Department of Nutrition, Faculty of Health Science of Hiroshima Shudo University, where she concerns about nutrition epidemiology.

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