Residual Levels of PCDD/Fs and Dioxin-like PCBs in retail food : Monitoring 2006 in Korea

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Introduction

The survey on PCDD/Fs and dioxin-like PCBs in retail food have been conducted by Korea food and Drug Administration (KFDA) since dioxin food crisis in 1999.[1] This periodic study on dioxin levels is useful tool to measure the trends of contamination in environment and get more reliable data to have a clear picture of the background presence of these substances in foodstuffs [2] and evaluate the risk assessment of PCDD/Fs and dioxin-like PCBs through food. The aim of this study was measure the levels of PCDD/Fs and dioxin-like compounds of retail food in Korea and then assess the health risks potentially associated with the PCDD/Fs and dioxin-like compounds intake.

Materials and Methods

In 3 Provinces((Seoul, Busan and Gwangju) of Korea, samples were taken by inspector over a period of march to May 2006 and analysis were done by the KFDA. A total of 60 samples tested for dioxins, furans and dioxin-like PCBs. The food samples used in the study included creals(rice), meat(beef, pork, chicken), fish(pacific mackerel, hair tail, eel, spanish mackerel, Alaska pllack, Flat fish, tuna(canned), anchovy, Sea Eel, oyster, crab), eggs, milk and dairy products(milk, cheese).

All the composite samples were homogenized and were spiked with the 17 $^{13}C_{12}$-labelled PCDD/Fs congeners and the 12 $^{13}C_{12}$-labelled PCBs and then samples extracted with Soxhlet extractor and cleaned-up by using the column sulfuric acid impregnated silica gel and purified on a series of silica gel, alumina and carbon column. Qualitative and quantitative determination of dioxins and furans was done by HRGC/HRMS. HRGC/HRMS analysis were performed with HP 6890 gas chromatography interfaced to a Finnigan MAT 95XL mass spectrometer which were in MID mode operating positive electron ionization at a resolving power of >10,000 at *m/z* 314 of FC43. The detection limits were 0.01ppt for TCDD/Fs, 0.02ppt for PeCDD/Fs, HxCDD/Fs and HpCDD/Fs and 0.04ppt for OCDD/Fs and 0.02ppt for dioxin-like PCBs at S/N >3.

Results and Discussion

The results of the monitoring 2006 are summarized in Table 1 giving the levels of PCDD and PCDF in foodstuffs. Regarding the results of the monitoring 2006 it is obvious that Korean

Products are contaminated only to a minor degree. The exceeding arise due to the limits of detection(LOD) of the analytical method and assuming the concentrations of non-detected congeners equal the limit of determination. The estimates of dietary intakes of dioxins and furans are based on the combination of food consumption data[3] and of analysed PCDD/F concentrations in 5 food groups. This estimated dietary intake is about 21.92 pg TEQ/day which on a body weight basis would correspond to approximately 0.4 pg WHO-TEQ/kg bw/day. It is only about 10% of TDI(4 pgTEQ/kg bw/day). It has to be noted that estimates of dietary intakes are limited because of the lack of food consumption data and because of uncertainties related to existing consumption data. Furthermore, there are uncertainties related to analytical methods and to methods used to estimate to dietary intake. In conclusion, The retail food in Korea was safe although the data is limited.

Table 1. Results of the monitoring 2006.(Estimated daily exposure to PCDD/Fs and DL-PCBs).

Food Group	Number of Samples	Level(pgTEQ/g ww)		Food intake (g/day)	Estimated daily Exposure(pgTEQ/day)
		Range	Average		
Rice	3	0.000~0.004	0.004	205.7	0.8228
Beef	5	0.010~0.194	0.101	17.8	1.7978
Pork	5	0.008~0.031	0.041	25.9	1.0619
Chicken	3	0.005~0.109	0.07	15.2	1.064
Egg(york only)	3	0.009~0.033	0.02	25.3	0.506
Milk	3	0.019~0.038	0.025	66.5	1.6625
Cheese	3	0.013~0.043	0.026	0.6	0.0156
Pacific mackerel	3	0.814~1.696	1.299	5.8	7.5342
Hair tail	3	0.396~1.494	0.954	2.2	2.0988
Eel	3	0.002~1.277	0.431	0.6	0.2754
Sea Eel	3	0.008~0.062	0.028	0.2	0.006
Spanish mackerel	3	1.644~2.227	1.901	0.6	1.1406
Alaska pollack	3	0.069~0.470	0.208	3.3	0.6864
Flat fish	3	0.223~0.234	0.233	2.1	0.4893
Tuna(canned)	5	0.001~0.093	0.029	2	0.058
Anchovy(died)	3	0.455~0.771	0.596	3.8	2.2648
Crab	3	0.014~0.078	0.056	2.1	0.1176
Oyster	3	0.058~1.021	0.393	0.8	0.3144
Sum	60			380.5	21.9161

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References

1. Suh, J. H., Choi, D. M., Lee, E. J., Hong, M. K., (2004) Organohalogen Compd., Vol 66, 2023-2026.
2. Commission Recommendation of 11 October 2004 on the monitoring of backgraound levels of dioxins ans dioxin-like PCbs in foodstuffs(2004/705/EC),(OJ L 321, 22.10.2004, p45).
3. Ministry of Health and Welfare(2005), Report on 2004 National Health and Nutrition Survey-Dietary Intake Survey. p1-711.