DECREASE IN BLOOD LEVELS OF DIOXINS AFTER THE ONE YEAR INTAKE OF FBRA IN JAPANESE

Junya Nagayama [1], Takumi Takasuga [2], Hiroshi Tsuji [3] and Teruaki Iwasaki [4]

Laboratory of Environmental Health Sciences, School of Health Sciences, Kyushu University, Fukuoka 812-8582, Japan [1]; Shimadzu Techno-Research Inc., Kyoto 604-8436, Japan [2]; Third Department of Internal Medicine, School of Medicine, Fukuoka University, Fukuoka 814-0180, Japan [3]; Genmaikouso Corp., Sapporo 001-0012, Japan [4]

Introduction

Our environments including food have been polluted with extremely toxic dioxins which are polychlorinated dibenzo-*p*-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and coplanar polychlorinated biphenyls (Co-PCBs) [1, 2]. Consequently, humans also have already been contaminated with these compounds [3, 4].

Adverse health consequences of dioxins have been investigated in the foetus and suckling which are considered the most sensitive stages of human life. In fact, we have already observed their unfavorable effects on thyroid hormone and immune response systems in Japanese infants perinatally and lactationally exposed to them[5, 6, 7].

In order to avoid or prevent their adverse consequences on foetuses and sucklings, active reduction of their contamination levels in mother's body seems quite important. In rats, dietary fiber and chlorophyll have been shown to promote the fecal excretion of PCDDs probably due to the inhibition of their absorption in the digestive tract to some extent, and therefore to decrease their levels in rat liver [8, 9].

In this study, we examined whether such kinds of effect were observed by FBRA, which was the brown rice fermented with *Aspergillus-oryze* and rich with dietary fiber, or not in Japanese adults.

Materials and Methods

FBRA has been manufactured for 30 years with Genmaikouso Corp., Sapporo , Japan and over 100,000 people have been taking it as one of the health foods.

Nine married couples of 37 to 48 ages were voluntarily participated in this study, and divided into two groups, which were matched for sex and age. One of these groups had taken 7.5 to 10.5g of FBRA after meals everyday for 1 year and the other not.

Before starting this study, blood levels of PCDDs and PCDFs in both groups were determined twice at 1 week intervals by high resolution GC/MS method [10], which were expressed as original levels. In order to examine the effect of FBRA on their excretion from the body, their blood concentrations were measured again twice at 1 week intervals 1 year after the intake of FBRA in both groups. Then, their mean levels were individually compared each other.

Toxic equivalent (TEQ) concentrations of PCDDs and PCDFs were calculated by using 1998 WHO TEF values [11]. TEQ-sum of all the congeners determined in the blood samples was summarized as the total 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD) TEQ concentration or level.

Results and Discussion

Changes in the concentrations of PCDFs in the blood of FBRA-intake and non-intake groups are shown in Fig. 1. Average original levels of PCDFs in the blood were 9.6 and 6.4 pg-TEQ/g lipid in FBRA-intake and non-intake groups, respectively, and mean concentration in the former group was somewhat higher than that in the latter one. One year after the intake of FBRA, blood levels of PCDFs seemed to show a decreasing tendency in both FBRA-intake and non-intake groups.

In order to investigate the changes in their blood levels more in detail, their relative concentrations were computed based upon their respective original ones as the standard (1.0 or 100), as indicated in Fig. 2.

In the FBRA-intake group, all the relative blood levels were decreased in 9 subjects and the average relative level was 0.62 or 62. In the non-intake group, however, relative concentrations in the blood showed a bit increase or no change in 2 subjects, and the mean relative level was 0.66 or 66. Therefore, FBRA considered to promote the excretion of PCDFs from the body, because we have observed very good correlation between their blood levels and those in other tissues such as the liver and adipose tissue [12, 13].

TEQ concentrations of PCDFs in the blood are shown in Fig. 3, before and 1 year after the intake of FBRA in FBRA-intake and non-intake groups. In the former group, 41% reduction in the blood level of PCDFs was observed 1 year after the intake of FBRA. In the latter group, however, the reduction rate was 34%. Consequently, the difference of the two groups in concentrations of PCDFs in the blood was 1.5 pg-TEQ/g lipid, which was about one half of that in the initial ones.

We observed the same kind but more pronounced effect of FBRA on PCDDs levels in the blood of the FBRA-intake group. Therefore, FBRA seemed to promote the excretion of PCDFs and PCDDs from the human body and decrease their body burden.

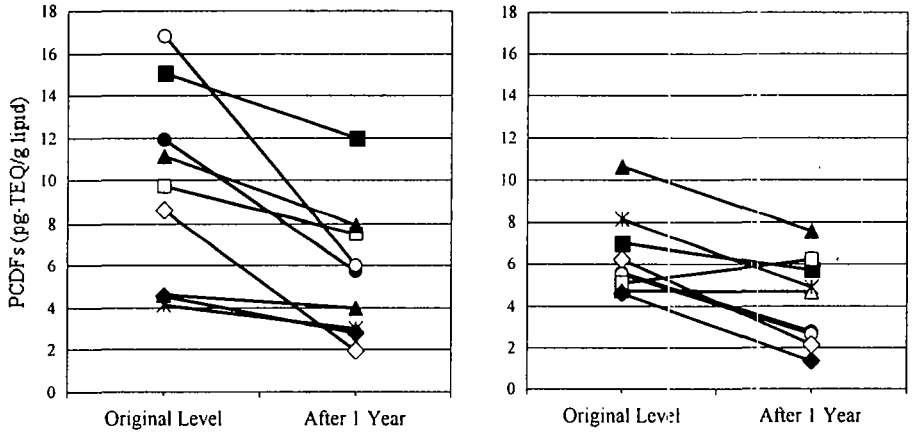


Fig. 1. Changes in the concentrations of PCDFs in the blood of FBRA-intake (left) and non-intake (right) groups

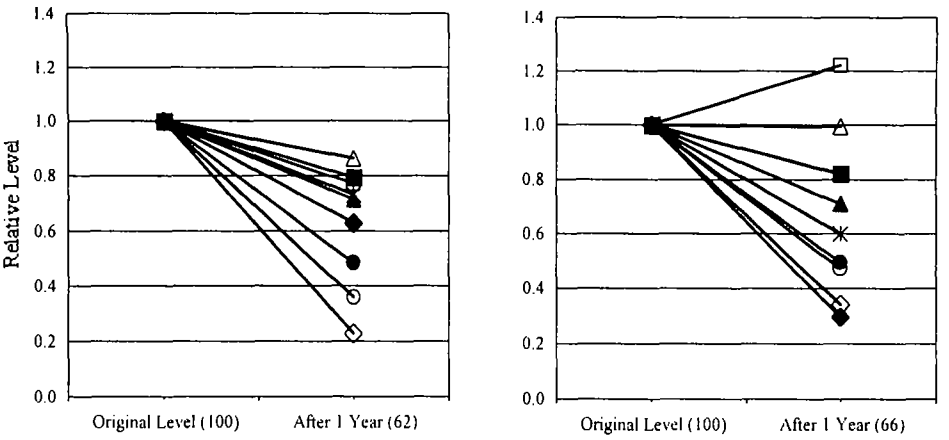
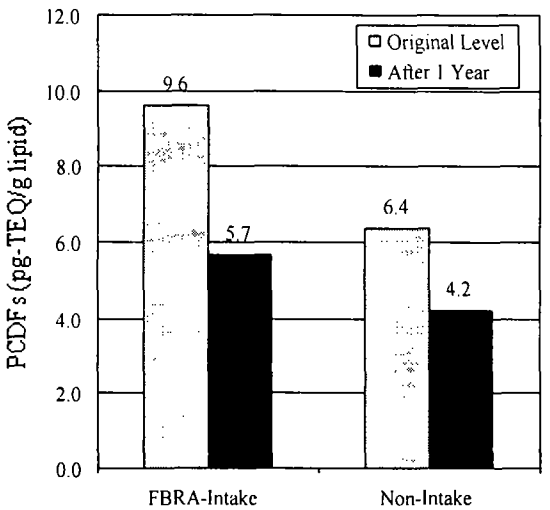


Fig. 2. Relative changes in the concentrations of PCDFs in the blood of FBRA-intake (left) and non-intake (right) groups
100 or 1.0 ; Original blood levels in respective groups (the standard)

Fig. 3. Average concentrations of PCDFs in the blood of FBRA-intake (left) and non-intake (right)



FBRA-Intake Group ; -41%, Non-Intake Group ; -34%

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