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## **Assurance of Food Safety: Food Xenochemicals**

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Recently, peoples' interest has been focused on their health through daily life. Above all, food is one of essential factor for our life maintenance and its effect on our lives is very large. On the other hand, there are many artificial substances in addition to natural ones around us, and some of them come into contact with us through food. Food additives, agrochemicals, food contaminants such as mycotoxins, chemical substances immigrate from food packages or undesignated chemicals (dioxins), produced during cooking, heavy metals, and so on are listed as food xenochemicals.

Even if the amount of these chemicals in food is very low, we can not avoid taking them during our life. So, the risk evaluation of exposure to chemicals through foods is required for the assurance of food safety. In Japan, the Ministry of Health, Labor and Welfare (MHLW) has established Food Safety Basic Law as well as Food Sanitation Law and has been carrying out the Total Diet Study to estimate the Japanese daily dietary intake of food additives and/or contaminants for this purpose.

### **1. Food additives**

Almost of all food contain food additives such as antioxidants and preservatives, and many people still anxious about health hazard exerted by these substances. The daily intake levels of food additives are much less than ADIs in Japan. The reassessments of food additives of natural origin have been undergoing, and the certification of additives permitted in EU and/or USA will be ongoing as a part of international harmonization of food additives now.

### **2. Mycotoxins**

Only aflatoxin B1 of less than 10ppb in peanuts and crops has been regulated under the law, patulin of 50ppb in apple and apple juice and deoxynivalenol of 1100ppb in wheat and corn were

added in the list in 2004.

### **3. Agrochemicals**

Pesticides are usually used at the farm for good yields of agro products, and kinds of pesticides permitted for agro products differ from country to country. The maximum residue limits (MRL) in food and ADI are established for each pesticide and the daily intake level has been under ADI as the results of the Total Diet Study. Among pesticides monitored, the intake of bromine is exceptionally high at more than 10% of ADI. The introduction of positive list system for certification of agrochemicals for agricultural products is proceeding now and sum of 647 chemicals would be listed in a couple of year.

### **4. Dioxins**

Dioxins except coplanar-PCBs are by-products of organochlorine agrochemicals and come into food. They have been demonstrated as an endocrine disruptor as well as strong toxicity or teratogenicity. The average daily intake of dioxins in Japanese has been estimated 1.49 pgTEQ/kg b.w./day in FY2002 compared to the TDI of 4 pgTEQ/kg b.w./day. The amount of intake have decreased gradually due to the enforcement of laws for dioxin discharges.

### **5. Chemicals immigrated from plastics for food container, packaging and wrapping films**

Under Food Sanitation Law, the amount of chemical substances eluted from tableware and food wrapping film into food or food simulants are regulated. Bisphenol A (BPA) or di-2-ethylhexyl phthalate (DEHP) is one of these chemicals and demonstrated to immigrate easily into food in some conditions. They have been suspected as endocrine disruptors and exerted estrogenic or anti-estrogenic actions as well as toxicity depending on intake level. In Japan, polycarbonate tableware at elementary schools has removed recently because of immigration of BPA into food as suspected endocrine disruptors in spite of the amount of immigration is below limitation established by Food Sanitation Law .

DEHP has been usually added to polyvinyl chloride products which many food manufactures use to prevent food from poisonous contamination. Immigration of DEHP into food also has been under the control by the law and TDI of 40 to 140 ug/kg b.w./day is established. In some packed food samples from the market, the amount of DEHP immigrated into food excess TDI has been reported, then the MHLW commented not to use gloves of polyvinyl chloride especially handling

foods rich in fat.

For the assurance of food safety, in addition to evaluate the adverse effect of each chemical on our health, the evaluation at the view point of the integrated effect of these chemicals and/or food ingredients as mixtures, especially along to meet with our daily exposure level will be required.

In clinical area, the number of people applied IVH will increase and many xenochemicals come into directly without metabolism, so that the interaction of food components and co-existed parent chemicals should be considered for safety evaluation of food for clinical aid. The interaction of parenteral food and drugs also will be important to evaluate the effects of drugs as well as the evaluation of drugs at present.