For discussion
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LegCo Panel on Food Safety and Environmental Hygiene

Study on Dietary Exposure to Dichlorodiphenyltrichloroethane (DDT) Of Secondary School Students

PURPOSE

This paper presents the findings of a study conducted by the Centre for Food Safety (CFS), Food and Environmental Hygiene Department (FEHD) assessing the dietary exposure to dichlorodiphenyltrichloroethane (DDT) of secondary school students in Hong Kong.

BACKGROUND

2. DDT is an organochlorine insecticide used to control insects in forest and on agricultural crops. It was also used to control household pests such as fleas, moth and lice, etc. Due to its effectiveness, long residual persistence, low acute toxicity and low cost, the application of DDT was once very popular. DDT may enter the environment via its production, transportation, application and disposal. Once released, DDT may be present in air, water and soil. There are studies indicating that as much as 50% of DDT can remain in soil after 10 years to 15 years of application. Owing to its adverse impact on the environment, DDT has been regarded as a persistent organic pollutant (POP) subject to international regulation. The use of DDT has been banned in many countries since the 1970s because of its persistence and accumulation in the environment after its extensive application, as well as its possible adverse effects on the environment and human health. In Hong Kong, DDT was deregistered in 1987 as a permitted pesticide. The use of DDT is also banned in the Mainland. In the international arena, the production and use of DDT are restricted for limited use for disease vector control in accordance with the recommendations and guidelines of the World Health Organization.

3. DDT and its metabolites are fat soluble. They are ubiquitous in the environment and may be present in food as a contaminant, accumulate in fatty tissues of living organisms and concentrate along the food chain. Dietary intake is the main source of exposure of the general population to DDT.

TOXICITY OF DDT

4. The International Agency for Research on Cancer (IARC) has evaluated and considered that there is sufficient evidence in laboratory animals but inadequate evidence in humans for its carcinogenicity. IARC classified DDT as possibly carcinogenic to humans (Group 2B). There was also evidence that DDT may cause impaired sexual development, reproduction and liver damage in experimental animals.

INTERNATIONAL REFERENCE ON SAFE INTAKE LEVEL

5. The Joint Food and Agriculture Organization/World Health Organization Meeting on Pesticide Residues (JMPR) has established a safety reference limit (provisional tolerable daily intake (PTDI)) of 10 µg/kg body weight per day for DDT.

6. PTDI is an estimate of the amount of a contaminant that can be ingested over a lifetime without appreciable risk. An intake above the PTDI does not automatically mean that health is at risk. Transient excursion above the PTDI would have no health consequences provided that the average intake over long period is not exceeded as the emphasis of PTDI is a lifetime exposure.

SCOPE AND METHODOLGY OF STUDY

7. To estimate the dietary exposure to DDT, CFS completed a study in April 2006 which covered six major food groups, namely cereals and cereal products; vegetables; fruits; meat, poultry, egg and products; seafood and dairy products. The food consumption data was extracted from the Food Consumption Survey conducted in local secondary school students in 2000 by FEHD. A total of 294 food samples were taken for analysis by the Food Research Laboratory (FRL) of CFS. The laboratory method and limit of detection adopted by the FRL for this study compared favourably with those adopted in similar studies conducted in other places.

RESULTS

8. The majority of the samples had DDT levels below the limit of detection. The dietary exposure to DDT for average secondary school student was estimated to be 0.145 µg/kg bw/day while that for the high consumer was 0.291 µg/kg bw/day. These exposures amount to 1.5% and

2.9% of the PTDI respectively and were both well below this safe intake level established by JMPR.

9. The main dietary source of DDT was "Seafood" which contributed 39% of the total exposure. Fish and oyster are particularly significant contributors to DDT exposure. This was followed by "Cereal and cereal products" which contributed 20%. "Fruits", "Vegetables" and "Meat, poultry and their products" each contribute 13%, 12% and 10% of the overall dietary exposure respectively. "Dairy products" only accounted for 6% of overall dietary exposure.

CONCLUSIONS AND RECOMMENDATIONS

10. The low dietary exposure to DDT reported in this study indicates that it is unlikely that food commodities available in the retail market in Hong Kong would pose adverse health risk to the consumers. Dietary exposures to DDT were 0.145 and 0.291 µg/kg bw/day for average secondary school student and high consumer respectively which are all far below the PTDI established by JMPR.

11. Although the risk of experiencing major toxicological effects of DDT is low, consumers are reminded to follow a balanced diet so as to avoid excessive exposure to contaminants from a small range of food items. Due to the ubiquitous nature of DDT in the environment, low levels of DDT in foods might be unavoidable. The trade should observe good agricultural and manufacturing practices to minimise DDT contaminants in food.

PUBLICITY

12. CFS will publicise the findings of the study through various channels to advise the public of the risk factors concerned and the ways to reduce the possible risk associated with DDT. Reports of the study will also be uploaded onto the website of FEHD (http://www.fehd.gov.hk/) and made available at major libraries and FEHD Communication Resource Unit and Health Education Exhibition and Resource Centre.

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