

COMMITTEE ON TOXICITY OF CHEMICALS IN FOOD, CONSUMER PRODUCTS AND THE ENVIRONMENT



STATEMENT ON SURVEILLANCE FOR PCDDS, PCDFS AND PCBS IN MARINE FISH AND FISH PRODUCTS

Introduction

1. We have been informed of the results of a survey conducted by the Joint Food Safety and Standards Group of the Ministry of Agriculture, Fisheries and Food and the Department of Health. Samples of marine fish, fish fingers and fish cakes were obtained from various sources between November 1995 and January 1996. All samples were analysed for the presence of the environmental contaminants known as polychlorinated dibenzo-*p*-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polychlorinated biphenyls (PCBs), (Joint Food Safety and Standards Group, 1999).

Tolerable Daily Intake

2. In 1992 we endorsed a Tolerable Daily Intake (TDI) for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2378-TCDD) of 10 picograms/kilogram body weight (pg/kg b.w.) which had been recommended by the World Health Organization (WHO) Regional Office for Europe. We recommended also that when considering mixtures of PCDDs and PCDFs the TDI could be regarded as being expressed in Toxic Equivalents of 2378-TCDD (TEQs), calculated using internationally agreed Toxic Equivalency Factors (TEFs) for various PCDD and PCDF congeners. Because of the accumulation of such compounds within the body and their long elimination half-lives, we considered that it was appropriate to regard the 10 pg/kg b.w. figure as a time-weighted average tolerable intake (Ministry of Agriculture, Fisheries and Food, 1992).

3. In 1997, as part of a consideration of the health hazards of PCBs, we considered that the use of TEFs for certain coplanar ("dioxin-like") PCBs offered a pragmatic approach to the evaluation of these compounds and that they should be considered in combination with the PCDDs and PCDFs (Department of Health, 1997).

4. Recently, we have reviewed the data used by a 1997 consultation of the WHO European Centre for Environment and Health (ECEH) to derive new

Toxic Equivalency Factors (WHO-TEFs) recommended for certain PCDD, PCDF and PCB congeners and endorse the use of these WHO-TEFs to calculate the TEQs in analysed samples (Van den Berg *et al.*, 1998).

5. We are aware that a recent WHO International Program on Chemical Safety/ECEH consultation has recommended that a Tolerable Daily Intake (TDI) of the PCDDs, PCDFs and PCBs, expressed as Toxic Equivalents (TEQ), is 1-4 pg TEQ/kg b.w./day (World Health Organization, 1998; van Leeuwen FXR and Younes M, 1998). We have not yet had the opportunity to review the data used by the consultation to derive the recently recommended WHO TDI. We will undertake such a review when a full report of the consultation is available and will consider whether any specific subgroups of the United Kingdom (UK) population might be particularly at risk. In the interim we have considered the surveillance data using both the current UK TDI and the recently recommended WHO TDI.

Evaluation of exposure

Adults

6. We have been provided with estimates of the intake of PCDDs, PCDFs and PCBs by individuals eating marine fish as part of their diet (Joint Food Safety and Standards Group, 1999). We note that the measured concentrations of PCDDs, PCDFs and PCBs in fish and fish products do not result in the average consumer exceeding either the current TDI or the upper value of the recently recommended WHO TDI. However, a high level (97.5th percentile) consumer of fish in combination with the rest of the diet, might ingest 5.6 pg TEQ/kg b.w. per day, because of the contribution from oily fish (e.g. herring, mackerel and salmon). This is slightly greater than the newly recommended upper value of the WHO TDI.

Schoolchildren

7. Estimates of intakes of PCDDs, PCDFs and PCBs by 10-15 year old schoolchildren based on a study of the diets of British schoolchildren (Department of Health, 1989) suggest that the average consumer in this age group will not exceed either the current UK TDI or the upper value of the recently recommended WHO TDI. We note that the high level (97.5th percentile) consumer in this age group has an estimated total daily intake of 4.7 pg TEQs/kg b.w. per day, just exceeding the upper value of the recently recommended WHO TDI.

8. However, we note that the data concerning the amounts and the various types of fish and fish products consumed by this age group are limited, as the survey population contained few children who consumed certain fish species. Therefore, these estimated intakes should be viewed with caution.

Toddlers

9. A survey of the diet of children aged 1½-4½ has been carried out (Gregory *et al.*, 1995). However, because the detailed records of 'toddler-specific' foods consumed by the survey participants have not yet been coded

into the appropriate species of fish, there is a lack of data to provide reliable estimates of dietary intake of the PCDDs, PCDFs and PCBs by children of this age range. We will review this matter when such data are available. Instead, we have been informed of the results of theoretical calculations made by scaling the consumption of fish and fish products by adults by the ratio of the caloric intakes of toddlers and adults so as to provide an estimate of the intake of PCDDs, PCDFs and PCBs from fish and the rest of the diet by the toddler age group (Joint Food Safety and Standards Group, 1999). We note that these estimates do not allow for possible differences in the proportion of fish in the diets of toddlers and adults nor for possible differences in the types of fish consumed by toddlers as compared to adults.

10. Calculations using this method suggest that the average intake of a toddler would exceed the upper value of the recently recommended WHO TDI. The total intakes of PCDDs, PCDFs and PCBs are estimated as ranging from 5.5-6.5 pg TEQ/kg b.w. per day, depending on age. A toddler who was consuming at the 97.5th percentile level would have total intakes of PCDDs, PCDFs and PCBs estimated as being in the range of 8.3-10 pg TEQ/kg b.w. per day. As mentioned above, we consider that these estimates may be unreliable.

Environmental factors

11. We have previously noted (Department of Health, 1997) that dietary exposure to PCBs in the UK has declined, as evidenced by a decrease in the concentrations of PCBs between Total Diet Study samples collected in 1982 and those collected in 1992. This is compatible with reductions in the concentrations of PCDDs and PCDFs in samples of human milk collected in developed countries between 1988 and 1993 (World Health Organization European Centre for Environment and Health, 1996). We anticipate that the measures already taken in the UK to reduce emissions to the environment will result in a continued decline. We note that the WHO-IPCS/ECEH consultation recommended that continued efforts should be made to reduce exposure towards the lower end of the range of the TDI that it had determined. This recommendation was made because of the consultation's recognition "that subtle effects might already be occurring in the general population in developed countries".

Nutritional aspects

12. We have taken into account the advice of the Department of Health's Committee on Medical Aspects of Food Policy (COMA) that there should be an increase in the consumption of oily fish to an average of one portion per person per week. This recommendation was made on the basis of evidence that increasing the intake of certain long chain polyunsaturated fatty acids (for which oily fish are a rich source) reduces the risk of cardiovascular disease (Department of Health, 1994). Adherence to this advice is likely to provide health benefits for most adults without exceeding the recently recommended WHO TDI and therefore we do not discourage the consumption of oily fish because of their content of the PCDDs, PCDFs and PCBs.

Conclusions

13. i) *We endorse* the use of WHO-TEFs for PCDDs, PCDFs and PCBs in the calculation of the TEQs for these compounds in analysed samples.

ii) *We will be undertaking* a full review of the data considered by the WHO-IPCS/ECEH consultation in determining its recently recommended TDI.

iii) *We welcome* the evidence that the average UK adult consumer will not exceed either the current UK TDI or the upper level of the recently recommended WHO TDI for PCDDs, PCDFs and PCBs.

iv) *We note* that a high level adult consumer of oily fish will have an intake of PCDDs, PCDFs and PCBs which falls between the current UK TDI and the newly recommended WHO TDI. *We note*, however, that such a consumer will be eating more fish than is required to meet the recommendation made by COMA on health grounds.

v) *We note* that the estimated intakes of PCDDs, PCDFs and PCBs by schoolchildren and toddlers do not exceed the current UK TDI but that it is possible that some children, in particular toddlers, may exceed the newly recommended WHO TDI. *We also note* that there are assumptions made in deriving the estimated exposures which mean that they should be viewed with caution. However, *we reiterate* our view that further monitoring of concentrations of PCDDs, PCDFs and PCBs in components of the UK diet should be undertaken to confirm that the trend to lower values continues.

vi) In order better to assess the implications of the intake of PCDDs, PCDFs and PCBs for the health of children, we would wish to review the data when additional information on the types and quantities of fish consumed by this age group is available.

vii) *We recommend* that adults adhere to the COMA advice to eat one portion of oily fish each week as this will confer health benefits and yet will not result in the majority of individuals exceeding either the recently recommended WHO TDI or the current UK TDI for PCDDs, PCDFs and PCBs.

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