WHO activities on quality assessment studies concerning PCBs, PCDDs and PCDFs

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Since 1985 the WHO Regional Office for Europe (WHO/EURO) has been coordinating a comprehensive programme on PCBs, PCDDs and PCDFs. It has been developed as a result of the public concern throughout Member States caused by the discovery of these highly toxic chemicals in the environment, in certain foodstuffs and even in human milk. These findings have led to a debate concerning the safety of breastfeeding. The programme includes a series of meetings, studies, consultations, and working groups, all carried out in collaboration with other international organizations and national institutions. During the last years this programme has been coordinated by the Bilthoven Division of the WHO European Centre for Environmental and Health (WHO/ECEH).

The main purposes of the programme are to:

- develop safety management strategies to evaluate, control and minimize exposure to these chemicals and to prevent environmental emissions;
- assess and minimize the health risks from these chemicals, especially to infants.

The activities developed within the programme can be divided into four categories: quality assessment studies, exposure studies, risk assessment activities, and risk management measures.

In 1987 a working group on the assessment of health risks in infants associated with the exposure to PCBs, PCDDs and PCDFs in breast milk met in Abano Terme, Italy. It had to base its assessment of health risks in infants[1)] on relatively limited research data available at that time on infant exposure levels and toxicity of these chemicals. This assessment was therefore regarded as an interim evaluation and the meeting recommended that more reliable exposure data should be produced to improve this risk assessment. Based on this recommendation WHO has been coordinating analytical exposure studies on levels of those chemicals in human milk. The first round of these studies was completed in 1987-88 with participation of twenty countries[2)]. The second round was started in 1992 and samples from 19 countries were collected and analyzed at qualified laboratories. A consultation was held in Berlin, Germany, in March 1994 to evaluate the

results[5]. The results revealed that levels of PCDDs/PCDFs are not increasing in Europe, and that for certain countries a dramatic decrease was evident. With regard to health risks in infants, it was concluded that there was no reason to change the recommendations for breastfeeding given by the Abano Terme consultation. It was recommended that WHO should perform similar field studies periodically (at five-year intervals) to assess trends in time.

In order to improve reliability and comparability of the analytical results from laboratories producing exposure data, and to develop sufficient regional capacity for these exposure assessments, WHO/EURO has initiated a series of international quality assessment studies between laboratories.

It was the objective of WHO that only those laboratories which have been accepted in the quality assessment studies coordinated by the WHO Regional Office, should be involved in the analysis of samples collected in WHO-coordinated exposure studies.

The First Round of studies, in which 11 laboratories participated, focussed on human milk only. The results of this study were evaluated by a consultation held in Umeå, Sweden, in August 1987. It was recommended that a new round be organized every second year from 1988 onwards, and that WHO/EURO should approach all known and potentially interested laboratories to ascertain their willingness to participate in the second round of these studies. In addition, it was concluded that methods to quantify more individual isomers of PCBs in human milk should be developed. The results have been published in the WHO Environmental Health Series no 34[2] .

Subsequently the Second Round of the study, in which nineteen laboratories from Europe as well as from elsewhere participated, took place in 1989-90. A consultation to review the results and to decide which of the participating laboratories produced acceptable results, was held in Rovaniemi, Finland, in June 1990. Results have been published in WHO Environmental Health Series no 37[3]. This consultation regarded it as necessary to continue the study and recommended that all laboratories performing such analyses should participate in a third round to be coordinated by WHO in 1991-92. It also recommended that the study design should be expanded to include certain foodstuffs (cows' milk and fish) in addition to human milk and blood. Furthermore, it recommended that three categories of chemicals should be included, namely PCDDs and PCDFs, dioxin-like PCBs and some other PCBs.

Based on that recommendation a third round of quality asssessment studies was organized by WHO with the assistance of a coordinating committee representing expertise in chemistry, toxicology and statistics. In this round 40 laboratories participated. The consultation on the results of theThird Round of Quality Control Studies on Levels of PCBs, PCDDs and PCDFs in Human Milk, Blood, Cows' Milk and Fish, was held in Volterra, Italy, in October 1992. The consultation evaluated and discussed the results based on statistical analyses and agreed on the final criteria to be applied for the acceptance of laboratories for analytical work for risk assessment by WHO. In addition the consultation evaluated analytical procedures in order to identify any weak points and to advise on methodological improvements. It also agreed on the establishment of an interntional network of experts to support and advise laboratories in developing and improving their methodologies, as well as to provide analytical support to those countries which are unable to build their own analytical facilities. It was recommended that future studies should be organized as a "rolling programme" in which a smaller number of matrices are considered at one time. Furthermore it was stressed that due

to the general abundance and dioxin-like properties of certain PCB congeners, as many laboratories as possible should participate in intercalibration for PCBs in addition to PCDDs and PCDFs. The selection of PCBs to be determined in futher studies should be based on the latest information on abundance and toxicology. The outcome of the consultation in Volterra has been published in the WHO Series; Environmental Health in Europe No 2[4].

Following the Third Round of the Quality Control study, and taking into account the comments received at the Volterra consultation, a strict protocol with respect to the study outline as well as the statistical analysis of the results has been developed by the coordinating committtee for the Fourth Round of the Interlaboratory Quality Assessment study. This study only includes human milk and

blood plasma as matrices to be analyzed. The main objectives of this Fourth Round are: to assess the analytical quality of the participating laboratories based on statistical evaluation of the between-laboratory comparability and within-laboratory medium-term reliability of the analytical data on individual PCDD, PCDF and PCB congeners included in the study, and, by assessing the results of a selected set of most toxic and/or abundant congeners, to identify laboratories from which the results can be accepted by WHO for exposure assessment studies. In this Fourth Round, which is well underway at this moment, 26 laboratories participate. The final results from the participating laboratories will be reported by October 1996 and the consultation to evaluate the results will be organized by WHO/EURO in Spring 1997.

Professor Ulf G. Ahlborg was a member of the coordinating committee of this study and represented the toxicological view point. His contributions to the quality assessment study and to all other areas of WHO "dioxin" programme were extensive. He was the key person in planning and initiating this programme, and his expertise is irreplaceable. Professor Ahlborg's innovative role and commitment to this programme has made it possible to develop and expand the programme to a remarkable project of international importance in evaluating and mimimizing the health risks and exposure to dioxins and related compounds. The place he left behind as an expert in this field will be extremely difficult to fill.

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