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SECOND ROUND OF EXPOSURE STUDIES ON LEVELS OF PCBS, PCDDs AND PCDFs IN HUMAN MILK

Summary Report on a WHO Meeting

Berlin, 23-24 March 1994

ABSTRACT

Assessment of exposure to polychlorinated dibenzo-*p*-dioxins (PCDDs), dibenzofurans (PCDFs) and polychlorinated biphenyls (PCBs), as well as of associated health risks, are priority issues within the framework of the WHO European Centre for Environment and Health Programme on Chemical Safety. Based on results obtained in a comparative study coordinated by the WHO Regional Office for Europe in 1987/1988 on levels of PCDDs, PCDFs and PCBs in human milk, a second study was conducted in 1992/1993 in which 19 countries participated. A consultation was held to evaluate the results obtained. It was attended by 21 experts from 16 countries, and four observers from the host institution. The evaluation revealed that the levels of PCDDs and PCDFs are not increasing, but rather decreasing in some European countries. Based on the results of the study, the participants concluded that breastfeeding should continue to be encouraged and promoted. They recommended that WHO coordinate a third round of exposure studies in due time.

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TARGET 19

ENVIRONMENTAL HEALTH MANAGEMENT

By the year 2000, there should be effective management systems and resources in all Member States for putting policies on environment and health into practice.

Keywords

MILK, HUMAN
POLYCHLORINATED BIPHENYLS
BENZOFURANS
DIOXINS
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Introduction

Over the past years the WHO Regional Office for Europe has coordinated a comprehensive programme, in collaboration with other international organizations and national institutes, on PCBs, PCDDs and PCDFs with the aim of evaluating their possible health risks, especially in infants, and preventing and controlling environmental exposure to these toxic chemicals. In 1987 the Regional Office invited an expert group to make an assessment of health risks in infants based on available research data on the exposure levels through breast-milk and on the toxicity of these compounds. The meeting concluded that at the levels found at that time in human milk, a margin of safety existed, although a rather narrow one. Taking into account the well proven and accepted benefits of breastfeeding for developing infants, the expert group strongly recommended that breastfeeding be encouraged and promoted.

Because the analytical data on exposure levels through breast-milk were rather limited, the Regional Office initiated a series of international studies on levels of PCBs, PCDDs and PCDFs in human milk. The first round of these studies took place in 1987/1988. A consultation held in Copenhagen in 1988 made a reassessment of health risks in infants based on exposure data from these studies. Because the measured exposure levels produced by these studies were the first reported for many years and countries, the consultation recommended that these studies be repeated at five-year intervals, in order to delineate the trends in exposure levels.

Based on this recommendation the Regional Office established a coordinating committee for these studies, which developed a standardized study protocol to assure the comparability of the results. It was also decided to expand the scope of the studies by including the dioxin-like PCBs in addition to PCDDs and PCDFs and other PCB congeners in order to improve the quality of the exposure data. To improve the reliability of the results, the coordinating committee recommended that only those laboratories which have qualified in the quality assurance studies coordinated by the Regional Office should be involved in analysing the collected samples.

The present Consultation was organized by the Bilthoven division of the WHO European Centre for Environment and Health with financial support from the Federal Ministry for the Environment, Nature Protection and Reactor Safety of the Federal Republic of Germany.

The purpose of the meeting was to evaluate and discuss the analytical results from different areas and countries in order to detect possible trends in levels of exposure to PCBs, PCDDs and PCDFs, to conduct

a reassessment of health risks in infants and to re-evaluate the possible health impact of breastfeeding. A further aim was to identify certain geographical areas with high exposure levels and to assess potential needs for risk assessment management activities aimed at reducing exposure further.

A total of 30 countries initially expressed their willingness to participate in this exposure measure exercise, but only 19 countries were able to collect the samples and produce analytical data by the agreed deadline. Funding for analyses conducted at the reference laboratory on samples from countries in economic transition was provided by the Swiss Federal Office of Public Health.

A total of 21 temporary advisers from 16 countries attended the meeting including representatives of participating countries as well as members of the coordinating committee. In addition, the meeting was attended by four observers from the Federal Health Office, Berlin, Federal Republic of Germany. Dr Hans Beck was elected Chairperson and Dr Blanka Krauthacker Vice-Chairperson of the meeting. Dr Martin Nygren acted as Rapporteur.

Discussion

The Consultation had extensive discussions about the study design and the practical applications. Difficulties experienced by participants and the analytical laboratories in completing the collection of samples and analysing them were reviewed. In this context it was noted that non-ortho PCB congeners should be analysed using high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS).

The design and practical applications of the present study were, in principle, similar to that of the first round, although additional chemicals were analysed.

Type of samples. Pooled milk samples from well defined groups of mothers living in at least two areas with different exposure levels were collected. Those countries participating in the first round of studies collected milk from the same area as last time. If individual samples were used in the first round, such individual samples were collected again in addition to the pooled samples. In the case of certain countries only individual samples were collected.

Selection of donors. Donors were primiparae. Both mothers and children had to be healthy. Mothers who had resided outside the area for more than six months during the past five years were excluded.

Collection of samples. Sampling was carried out between two weeks and two months after delivery.

Questionnaire. A detailed questionnaire was used as the basis for the interview with the donating mothers.

All samples were analysed by qualified laboratories. For those countries without access to qualified laboratories, samples were sent to the Laboratory of Organic-Analytical Chemistry at the National Institute of Public Health and Environmental Protection (RIVM), Bilthoven, Netherlands. All questionnaires from participating countries were sent to the Regional Office.

According to the original study design, all samples were analysed for 17 PCDDs and PCDFs, 3 non-ortho PCBs, 2 mono-ortho substituted PCBs and 6 other PCBs. All results were expressed on the basis of fat, and the toxic equivalents (TEQs) were calculated where applicable. In addition, some laboratories also provided data on other PCB congeners.

The evaluation of the analytical results revealed that levels of PCDDs and PCDFs are not increasing and that for certain countries a dramatic decrease could be seen.

The health risks in infants were also discussed. Based on the data from this study it was concluded that there was no reason to change the WHO recommendations^{a,b} for breastfeeding.

Further exposure studies were regarded as highly desirable and the interval and content of these studies were discussed, as well as the need for quality assurance exercises.

Conclusions

1. Good progress has been made in the analytical field studies, especially for the determination of PCB congeners, and information on levels of PCBs, PCDDs and PCDFs in human milk is now available from many European countries.

2. The results of the present study show that levels of PCDDs and PCDFs are not increasing. In some countries levels tend to decrease and some countries even show a dramatic decrease up to 50%, in comparison with the 1987 study. For PCBs the situation is not so clear since many countries used different, and sometimes less reliable, analytical methods in the first of the two studies.

^a PCBs, PCDDs and PCDFs in breast-milk: assessment of health risks. Copenhagen, WHO Regional Office for Europe, 1988 (Environmental Health Series No. 29).

^b Levels of PCBs, PCDDs and PCDFs in breast-milk. Copenhagen, WHO Regional Office for Europe, 1989 (Environmental Health Series No. 34).

3. Data available at the present Consultation have not given any reason to change the recommendation made in 1987 by a WHO working group: "Despite the presence of PCBs, PCDDs and PCDFs in human milk, breast-feeding should be encouraged and promoted on the basis of convincing evidence of the benefits of human milk to the overall health and development of the infant."^a Thus, the present knowledge does not justify the limitation of breastfeeding or the elimination of specific food items from the diet.

4. Primary preventive measures to control and to reduce the discharge of these chemicals into the environment are considered the most effective way to limit and minimize exposure.

5. Analysis of pooled breast-milk samples is a useful non-invasive means to estimate the overall exposure of a local population.

Recommendations

1. Breastfeeding should be encouraged and promoted due to its known benefits to the overall health and development of infants.

2. Taking into account all additional exposure data and the developing new toxicological information, WHO should convene a new consultation on health risks in infants associated with exposure to halogenated organic compounds and on the impact of exposure during the prenatal period.

3. WHO should coordinate a third round of exposure studies to expand the database; allow detection of possible trends in exposure to PCDDs and PCDFs as well as relevant PCB congeners; and identify geographical areas with high exposure levels.

4. The field studies on levels of PCBs, PCDDs and PCDFs in human milk should be performed at five-year intervals to assess trends in time. WHO should invite countries that have not yet participated to join the analytical field studies. In conducting these studies the present study protocol should be followed as closely as possible to permit trend analysis of exposure.

5. If there is an indication of high exposure of a local population, specific pathways of contamination through air, soil, water and food should be investigated.

6. In areas with exceptionally high exposure, the relations between levels, sources of exposure and potential health effects should be evaluated.

7. Interlaboratory quality control studies should be continued on the analysis of PCBs, PCDDs and PCDFs in human milk. If new analytical field studies on levels of other chemicals in human milk are planned, relevant interlaboratory quality studies

should be carried out before starting the actual field studies.

8. The report on the second round of analytical field studies should be published during 1994 as a WHO document; each participating country is free to publish its own results separately.