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Bavarian breast milk survey – Pilot study and future developments

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Abstract

For more than 20 years the Bavarian Health and Food Safety Authority has carried out breast milk analyses of persistent pesticides and selected organohalogen compounds. On the one hand, continuous monitoring of the levels of these chemicals in human breast milk shows a decreasing trend over these two decades. On the other hand, the number of samples sent to our institution for analysis has continuously decreased. Given the unreliable data on burden of environmental chemicals as well as the toxicologically outdated spectrum of analyzed substances, a new concept for the monitoring of breast milk has been developed and tested within a pilot study. We present here first results on PCDD, PCDF and dioxin-like PCB (dl-PCB) concentrations in breast milk of 43 women living in Bavaria, Germany. The average concentration of PCDD, PCDF and dl-PCB were 4.93, 4.98 and 9.92 pg WHO-TEQ/g fat, respectively.

The new surveillance program (Bavarian Monitoring of Breast Milk, BAMBI) should track time trends of chemicals' concentrations in breast milk, while also monitoring new chemicals, such as PBDE or PFC, on which little or no German data exist.

Keywords: Breast milk monitoring; PCB; PCDD; PCDF; PBDE; PFC

Introduction

Breast milk is the natural and ideal food for infants containing the optimal composition to meet the nutritional needs of the newborn. Breastfeeding offers many advantages to both babies and mothers providing immunological, psychological and economic benefits. Yet, in our industrialized world unwelcome environmental chemicals that may cause adverse health effects are secreted with the breast milk as a result of mother's body burden or current exposure. Thus, over the past several decades the interest in using breast milk as a biomonitoring matrix has increased. The WHO has carried out a series of international exposure studies on levels of contaminants in breast milk (WHO, 1989, 1996; Malisch and van Leeuwen, 2003).

Since 1985, the Bavarian Health and Food Safety Authority carries out breast milk analyses of persistent pesticides and selected organohalogen compounds, such as polychlorinated biphenyls (PCB), hexachlorobenzene (HCB) and 1,1,1-trichloro-2,2-bis(chlorodiphenyl) ethane (DDT). Continuous monitoring of the levels of these chemicals in breast milk shows a decreasing trend over the last 20 years (Fig. 1).

Within the last decade, the number of samples sent to our institution for analysis has continuously decreased (Fig. 2). In the year 2005, 19 samples were analyzed in comparison to 461 samples in 1994. Given the small

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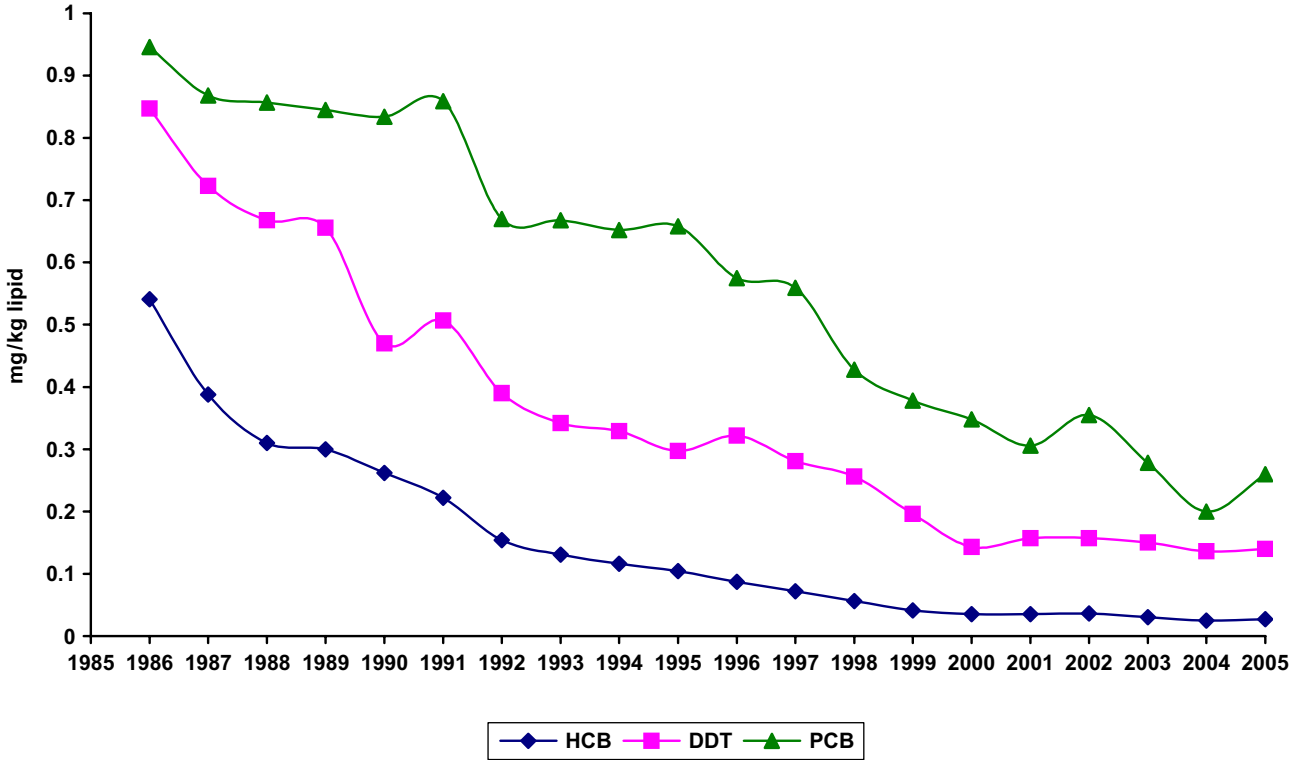

Fig. 1. Time-trend analysis: mean concentrations of HCB, DDT and indicator PCB (the sum of PCB congeners 138, 153, 180) in breast milk samples from Bavaria.

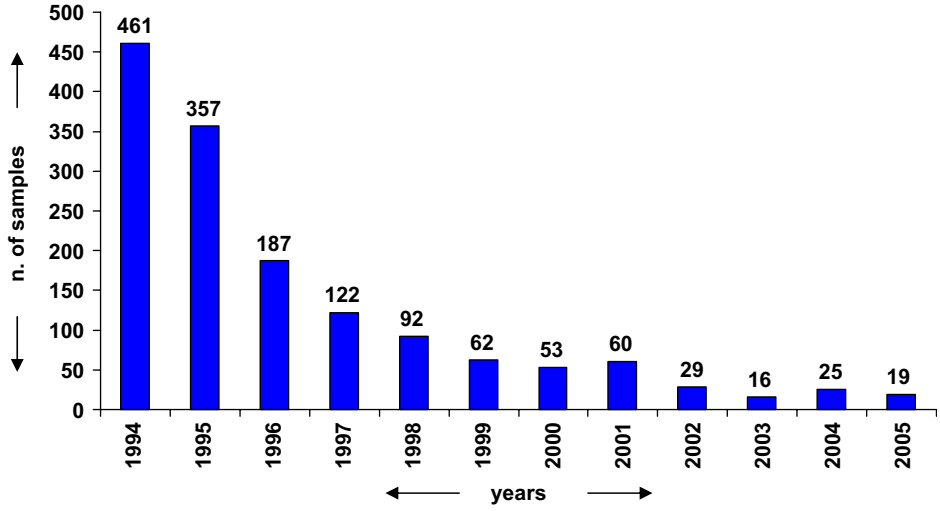

Fig. 2. Number of analyzed breast milk samples in Bavaria.

number of samples and the presumably selected group of mothers providing milk samples, results do not necessarily reflect the average background body burden of environmental chemicals in the whole population. Additionally, the spectrum of analyzed substances does not include important chemicals being of toxicological concern or public interest. Thus, a new concept for the monitoring of breast milk is required in Bavaria as part of the public health program.

Material and methods

Samples

Breast milk samples were collected from primiparous mothers who delivered their baby in the Department for Neonatology of the Children's Hospital at the Department of Gynecology and Obstetrics in Munich between May 20, 2005 and August 5, 2005. The mothers collected