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### Exposure assessment by milk biomonitoring

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Background: Exposure to polychlorinated biphenyls (PCBs) and other persistent organic pollutants (POP) of women at childbearing age has been assessed by monitoring breast milk since 1986 and by duplicate diet sampling in 1998 and 2004.

Objectives: To estimate the body burden and the range of dietary intake and the time course of exposure via food and compare the data with biological monitoring results to calculate half-lives of individual POPs.

Methods: We analyzed POPs and PCBs in breast milk and TEQs in duplicate diet samples on 5 days of 11 (age: 20 - 40) women from Northern Germany in 2003. Daily intake (DI) was calculated as: concentration in food [ $\mu\text{g}/\text{kg}$ ] x daily food intake [ $\text{kg}/\text{day}$ ]/bodyweight [ $\text{kg}$ ]. Half-lives were calculated as  $t_{1/2} = C_{ss} \cdot V_d / DI \cdot (1/\ln 2)$

Results: The concentrations of most contaminants in breast milk declined over the past 20 years. The daily average intake of food is  $\sim 1000$  g/day /person (range 500 - 2200 g), the mean lipid content of the fresh food was 12 % (5 - 25 %). PCBs and DDT were the main contaminants. The median DI [daily intake ng/(kg bw/day)] for the different compounds were as follows: 0.6 for alpha-HCH, 1.5 for HCB, 3.4 for DDT+DDE, 8 and 12 for sum of PCBs. With respect to our former duplicate diet study in 1997, a decline in food contamination is evident and amounts to 34 % for PCBs, 23 % for DDT and 62 % for HCB. The TEQ-DI (dioxin and dl-PCB) declined from 1997 (2.6 pg/kg bw) to 2003 (2.05 pg/kg bw) by 22%. Calculated half-lives for individual POPs in food were: PCB-101, 1.5; PCB-118, 2.5; PCB-138, 5; PCB-153, 6.8, PCB-180, 7.5; DDT, 6.25; HCB, 6.6 years.

Conclusions: The diet and biomonitoring exposure data indicate a near steady state of environmental pollution/redistribution and carry-over in the food chain. A slower decline of the body burden in the future is anticipated. A kinetic calculation of the estimated body fat burden at steady state from the daily intake in young women is in concordance with the present levels found in breast milk, indicating that the exposure of the population occurs mainly via the food-chain. It is strongly recommended to continue with monitoring breast milk.