



SCHOOL OF PUBLIC HEALTH
LI KA SHING FACULTY OF MEDICINE
THE UNIVERSITY OF HONG KONG

BREAST MILK DIOXINS IN HONG KONG

HEDLEY AJ¹, WONG TW², HUI LL¹, MALISCH R³, NELSON EAS⁴

¹Department of Community Medicine and School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China

²Department of Community and Family Medicine, The Chinese University of Hong Kong,

School of Public Health, Prince of Wales Hospital, Hong Kong SAR, China

³The State Institute for Chemical and Veterinary Analysis of Food Freiburg, Germany

⁴Department of Paediatrics, The Chinese University of Hong Kong, Prince of Wales Hospital, Hong Kong SAR, China



THE CHINESE UNIVERSITY
OF HONG KONG

Background

Polychlorinated biphenyls (PCBs), polychlorinated dibenzo-para-dioxins (PCDDs) and dibenzofurans (PCDFs) are a group of halogenated aromatic compounds that are widespread and persistent environmental pollutants. The human fetus is exposed to dioxins and PCBs through the placenta. These compounds are also found in breast milk and their levels reflect the body burden of primiparous mothers. Dioxin levels in breast milk of primiparae have been monitored in some Western countries because it reflects the degree of exposure in the general population. The WHO/EURO has co-ordinated two dioxin exposure studies by using human milk samples in the 80s and 90s. The third round exposure study was carried out in 2002-03 in 26 countries/regions, including Hong Kong SAR. The findings will help to support and guide the further development of environmental policy on the control of dioxin production and emissions in Hong Kong and South China.

Methods

Thirteen pools of breast milk (Table) comprising samples from 316 primiparous mothers delivered in Hong Kong in 2002 were analysed by Gas Chromatography/Mass Spectrometry (GC/MS) to estimate the concentrations of the target 29 dioxin and dioxin-like PCB compounds. Subjects were recruited from 16 local Maternal and Child Health Centres. Milk was collected at 2-6 weeks postpartum. The thirteen pools were created with the highest internal homogeneity and between-pool diversity achievable in terms of geographic (Hong Kong, Mainland China, Overseas) and dietary (dairy products and seafood) exposures.

Table: Characteristics of the thirteen pools.

Pool	Characteristics of the pool	
	Residential	Others
1	Hong Kong	Ever-smokers
2	Hong Kong	High dairy product intake
3	Hong Kong	High seafood intake
4	Hong Kong	Low dairy AND seafood intake
5	Hong Kong	High dairy OR seafood intake
6	Mainland China	Low dairy AND seafood intake
7	Mainland China	High dairy OR seafood intake
8	China Immigrant	2-6 years stay in Hong Kong
9	China Immigrant	7 years stay in Hong Kong or above
10	Overseas	1-10 years of overseas stay
11	Overseas	11 years of overseas stay or above
12	Mixture	Low dairy AND seafood intake
13	Mixture	High dairy OR seafood intake

GC/MS analyses were carried out to determine the mass concentration of each of the 29 target congeners were multiplied by their corresponding 1998 WHO-TEF (Toxic Equivalence Factor) to give the toxic equivalents (TEQ) to TCDD. The dioxin level in each pool determined by GC/MS as WHO-TEQ (pg/g fat) was calculated by summing the TEQs of the 29 congeners.

Results

The mean WHO-TEQ concentrations of dioxins and dioxin-like PCBs determined by the GC/MS analysis on thirteen pools comprising 316 Hong Kong milk samples was 12.9 pg WHO-TEQ/g fat (median 13.4; range 9.0 to 16.7). (Figure 1) The pools comprising mothers living in Hong Kong since birth generally had higher WHO-TEQs compared to pools from mothers mainly living in Mainland China. On average, PCDDs, PCDFs and PCBs contributed respectively 39%, 25% and 36% of the total WHO-TEQ.

Compared with the other 25 countries/regions participating in the 2002-03 WHO exposure study on the levels of PCDDs, PCDFs and PCBs in human milk, the median PCDD/F-WHO-TEQ of Hong Kong was ranked 14th (Figure 2) and the median PCB-WHO-TEQ was ranked 17 (Figure 3).

Conclusions

Levels of dioxins and dioxin-like compounds in breast milk in Hong Kong are in the lower to middle range of the World Health Organisation co-ordinated exposure study of dioxins in 26 countries/regions. A firm conclusion from this survey and other studies is that the current recommendations on the safety and benefits of breastfeeding should be supported and reinforced in Hong Kong.

Figure 1

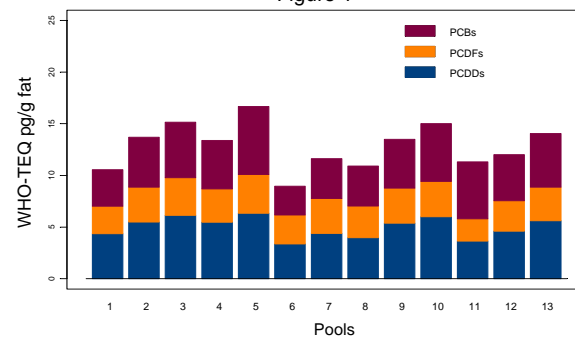


Figure 2

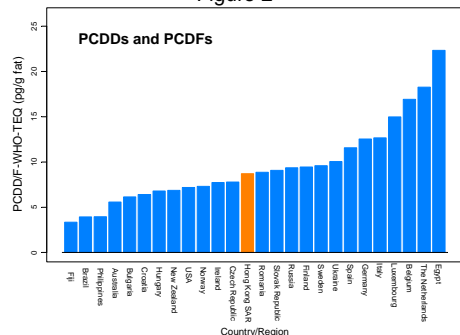
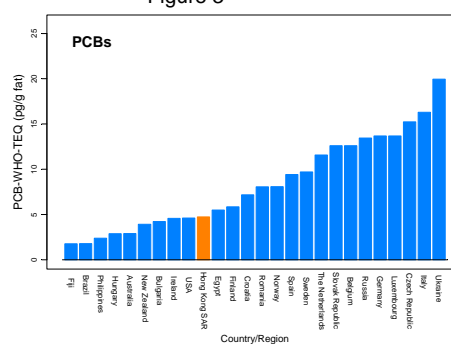


Figure 3



Reference

Hedley AJ, Wong TW, Hui LL, Malisch R, Nelson EAS. *Breast milk dioxins in Hong Kong and Pearl River Delta. Environ Health Perspect.* 2006. 114:202-8.

Acknowledgements

This study is funded by the Environmental Conservation Fund (8/2000). We would like to thank the mothers for donating their milk samples and doctors and nurses at the Maternal and Child Health Centres, Hong Kong Department of Health for their support.