

# CHILDHOOD HEALTH AND DEVELOPMENT IN RELATION TO PERSISTENT ORGANOCHLORINE COMPOUNDS

## NO MEASURABLE CHANGES OF BIOLOGICAL PARAMETERS IN BREAST-FED INFANTS DUE TO POP BACKGROUND EXPOSURE

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### Introduction

The accumulation of lipophilic and biologically persistent chlorinated hydrocarbons in the food chain leads to a relatively high exposure of breast-fed infants<sup>1,2</sup>. The fact that infants breast-fed for several months reach relatively high PCDD/PCDF/PCB concentrations compared to general background levels has caused concern about possible negative health effects in these children, whose developing biological functions (e.g. immune system) might be more sensitive. On the other hand, breast-feeding has several advantages for mother and child, and is recommended by paediatricians world-wide.

### Study design

We performed a new study in 11-month-old infants who had been fully breast-fed for at least four months (n=80). The main aim was to measure an extensive test program for biological parameters possibly influenced by the POP exposure. In contrast to other studies, this exposure could be directly determined by measurement of the concentrations in blood fat. We especially looked for infants in whom different levels of exposure had to be expected: lower exposure (young mother, siblings also breast-fed for a longer period), or higher exposure (older mother, first infant breast-fed, region with higher PCDD/PCDF background contamination). Children had to meet the following inclusion/exclusion criteria: healthy infants (German by descent in order to reduce genetic variability and cultural influences) born at term, no new infection during the last two weeks before blood sampling, tetanus and diphtheria vaccination at least twice, no passive exposure to cigarette smoke. Additionally, formula-fed infants (breast-fed for less than 2 weeks, n=21) with low POP exposure were investigated.

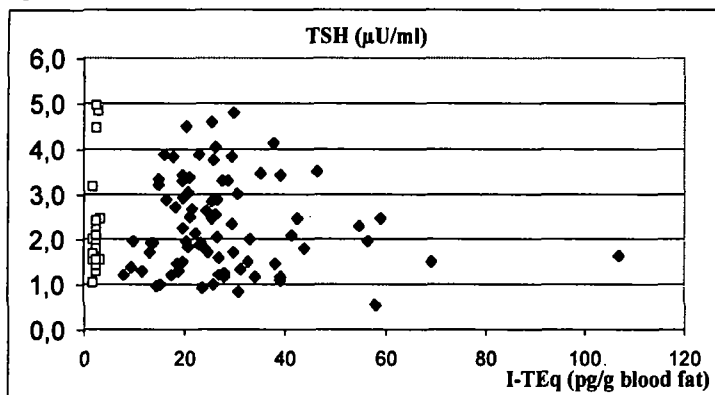
### Material and Methods

Heparin blood was taken by the same person in the morning before breakfast from the infants (15 ml). Laboratory methods have been described in more detail previously<sup>3</sup>. 73 biological parameters were measured including blood count, lymphocyte subpopulations, lymphocyte proliferation, routine clinical chemistry, immunoglobulins, IgG subclasses, thyroid function, specific antibodies (tetanus and diphtheria toxoid, HiB), cytokine production of lymphocytes/monocytes and granulocyte function. Plasma (3 to 5 ml) was frozen at -20°C for analysis of PCDDs, PCDFs, PCBs, pp-DDE, HCB and  $\beta$ -HCH (ERGO Forschungsgesellschaft, as described previously<sup>4</sup>). For statistical evaluation, Spearman correlation analysis was done for the 73 biological parameters and concentrations of I-TEQ, WHO-TEQ (including PCBs), Sum of PCB 138/153/180, HCB,  $\beta$ -HCH and pp-DDE (only breast-fed infants were included). Significant correlations ( $p < 0.05$ ) underwent multivariate analysis using linear regression.

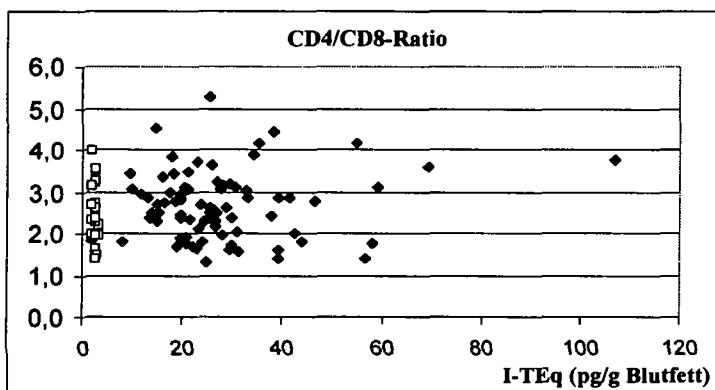
### Results and Discussion

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After correlation analysis and multivariate testing, no significant association of the six POP compounds/compound groups could be found with any of the parameters, including TSH (Figure 1) and lymphocyte CD4/CD8 ratio (Figure 2). Therefore, results of other studies<sup>5,6,7</sup> could not be confirmed. For background contamination with POPs we conclude that postnatal exposure due to breast-feeding does not have a significant influence on these biological parameters of infants.



**Figure 1**  
Correlation of thyroid-stimulating hormone (TSH) and I-TEq concentrations in blood fat. Bright symbols: formula-fed infants (not included in statistical analysis)



**Figure 2**  
Correlation of lymphocyte CD4/CD8 ratio and I-TEq concentrations in blood fat. Bright symbols: formula-fed infants (not included in statistical analysis)

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