

## LEVELS AND PATTERNS OF PCDF AND PCDD IN EGGS, CHICKEN AND HUMAN BLOOD OF RESIDENTS LIVING ON A CONTAMINATED AREA: INVESTIGATION OF A POSSIBLE RELATIONSHIP

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### ABSTRACT

We report on PCDD and PCDF levels of 18 blood samples obtained from individuals who had consumed eggs and chicken produced mainly or exclusively on contaminated soil. The analysis of these samples shows blood concentrations of several PCDFs far above background levels with a maximum value of 214 pg ITE per g blood (lipid based) for the total amount of PCDD and PCDF. Compared to the PCDD/PCDF pattern of soil and of eggs produced on this soil these data reflect a transfer of selected congeners from soil to man via food.

### INTRODUCTION

Food consumption is generally assumed to be the dominant path of intake of polychlorinated dibenzodioxins (PCDD) and dibenzofurans (PCDF). The major food items contaminated by this class of substances are fatty food products like milk, eggs, fish and meat<sup>1</sup>.

Milk from cows grazing in the vicinity of a waste incinerator and chicken near a PCP wood treatment plant have been reported to be contaminated by PCDD and PCDF far more than the normal range of consumer products<sup>2,3</sup>.

Due to findings of elevated PCDD and PCDF levels in soil<sup>5</sup> concerns emerged about potential exposure of residents who had lived in this area for several decades. This

# EXP

referred especially to those who had consumed animal farm products like eggs and poultry. Analysis of some samples of eggs and chicken showed up to thirty fold higher PCDD and PCDF contents than those in commercial products<sup>6</sup>.

Blood samples of selected residents were analysed to investigate whether elevated PCDD/PCDF soil concentrations could affect human body burden and to evaluate a possible relationship between food consumption and body burden.

## MATERIAL AND METHODS

Data were obtained from a study conducted in northern Germany.

Individuals who reported consumption of eggs and chicken produced on their own ground were identified by means of a questionnaire and invited to participate in this PCDD/PCDF study.

The blood samples collected at the Environmental Health Counselling Center were immediately frozen and kept frozen until analysed for PCDD and PCDF by ERGO. The analytical methods were nearly identical to those used for the successful participation in the WHO interlaboratory validation study on PCDD and PCDF in human blood<sup>7</sup> and will not be described here. Additional information regarding nutritional behaviour and selected clinical data were obtained by means of a questionnaire regularly used at the Counselling Center.

## RESULTS

The blood levels of PCDD and PCDF in the study group range up to 214 pg ITE per g blood fat (Table 1). The highest levels have been detected in elderly persons.

Table 1. PCDD/PCDF levels in blood samples (pg ITE/g lipid base)

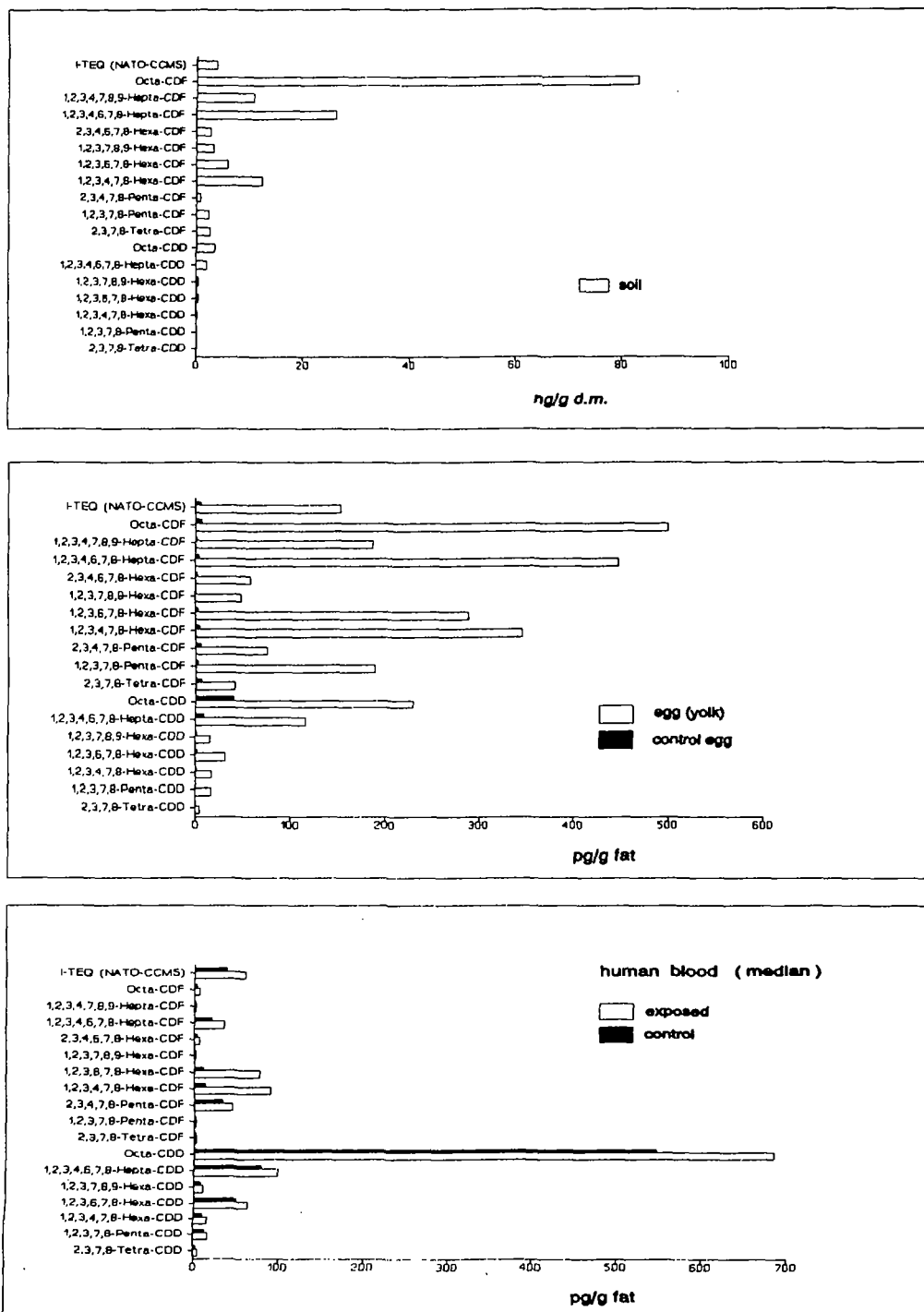
age [years]	N	min	max	median
20 - 29	3	38	42	41.5
30 - 39	8	21	84	37.0
40 - 59	2	51	214	132.6
60 - 69	3	52	80	74.5
70 - 79	3	60	162	105.2

As shown in Figure 1, the PCDF concentrations in blood exceed the PCDD by far. This applies to the distribution of PCDD and PCDF in soil, eggs and chicken, too. For comparison examples of soil and egg samples are included in this figure .

## DISCUSSION

The results of this study demonstrate the relevance of consumption of eggs and chicken produced on contaminated soil on human blood levels of PCDD and PCDF. Furthermore the congener patterns of soil, eggs and human blood almost show the same distribution, especially the dominance of Hexa- and Hepta-CDF. Thus the

**Figure 1 : Distribution of 2,3,7,8-Isomers in soil, eggs and human blood**  
(soil data from <sup>5</sup>, egg data from <sup>6</sup>)



elevated PCDF blood levels can be traced back to the consumption of contaminated eggs and chicken produced on contaminated residential soil.

To our knowledge the PCDF blood concentrations reported in this study are the highest with regard to food consumption from contaminated soil. These findings are consistent with recent reports on elevated PCDD/PCDF blood levels: one person from Rheinfelden, South Germany, after consumption of eggs highly contaminated by PCDD and PCDF (blood level: 156 pg ITE/g fat, eggs: 298 pg ITE/g fat, soil: 1 - 2 ng ITE/g dry matter)<sup>8</sup>, and one person from Lower Saxony who had accumulated 186 pg ITE per g in his blood fat.

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