Levels of PCDDs and PCDFs in blood plasma from a Spanish family exposed to contaminated oil.

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Introduction

In a previous article we have described an incident in which a family was exposed to PCDDs and PCDFs by consumption of contaminated olive oil [1]. All the members of the family were affected to varying degrees by chloracne which appeared in August 1982. At that time we analysed a small pooled serum sample from four members of the family. The analysis revealed very high amounts of the higher chlorinated dioxins in both the oil and the pooled serum sample. Three years later, 1990 we were able to obtain individual blood samples from the entire family, including the 8 year old boy who was born just after they had ceased to eat the oil.

Analytical method

The analytical method for the determination of trace levels of PCDDs and PCDFs is described elsewhere [2]. The mass spectrometric data was obtained by means of HRGC/HRMS techniques using a VG-250S high resolution MS operating in electron-impact mode.

Results and discussion

The small pooled sample that we analysed in 1987 was taken from four of the family members, the father and three children.

The family consists of nine members: mother, father and seven children aged between 8 and 20 at the time of sampling. Table 1 presents the means and the ranges of blood serum levels from eight of the family members.

The youngest boy , 8 years old, was exposed in utero. He was born in November 1982 and was admitted to hospital a few days after birth due to convulsions of unknown origin. The mother was advised to stop breast feeding the boy.
The boy exhibits a retardation of growth.

Table 1.

	Pooled sample (1987)	Family 1 (n=8) (1990)		Boy 8 years old (1990)
		Mean	Range	
PCDDs				
2,3,7,8-TCDD	ND	-	ND - 2.8	ND
1,2,3,7,8-PeCDD	110	42	ND - 77	ND
1,2,3,4,7,8-HxCDD	300	100	30 - 240	29
1,2,3,6,7,8-HxCDD	1 300	471	180 - 1100	50
1,2,3,7,8,9-HxCDD	1 300	243	26 - 920	ND
1,2,3,4,6,7,8-HpCDD	40 000	12 000	1 800 - 46 000	1 600
OCDD	940 000	140 000	20 000 - 300 000	14 000
PCDFs				
2,3,7,8-TCDF	ND	-	ND - 1.5	ND
1,2,3,7,8-PeCDF	ND	-	ND	ND
2,3,4,7,8-PeCDF	48	4.3	ND - 7.9	29
1,2,3,4,7,8-HxCDF	58	10	ND - 19	120
1,2,3,6,7,8-HxCDF	ND	6.9	ND - 13	ND
2,3,4,6,7,8-HxCDF	56	29	ND - 74	ND
1,2,3,4,6,7,8-HpCDF	730	98	21 - 200	160
1,2,3,4,7,8,9-HpCDF	ND	-	ND	150
1,2,3,4,6,8,9-HpCDF	**ND**	-	**ND**	**500**
OCDF	810	-	ND	3 900

The pooled sample from four family members, taken 5 years after they had consumed the olive oil, contained very high amounts of PCDDs. Three years later the levels of PCDDs had decreased but were still very high. The values for HpCDD and OCDD were between 1.8 - 46 and 20 - 300 ng/g serum lipids, respectively.

The previous analyses of the pooled blood sample also showed unusually high levels of 1,2,3,4,6,7,8-HpCDF and OCDF. In the new analysis less amounts of HpCDF was found and OCDF is below the detection limit. Thus, for all family members except the youngest boy, it seems that these isomers have cleared from the body.

The levels of 1,2,3,4,6,7,8- and 1,2,3,4,7,8,9-HpCDFs and OCDF in the youngest boy, who was exposed transplacentally in utero, are unexpectedly high. Furthermore the serum concentrations of 2,3,4,7,8-PeCDF and 1,2,3,4,7,8-HxCDF are also high compared with those of the rest of the family.

The presence of 1,2,3,4,6,8,9-HpCDF is of special interest. Such isomers (i.e. not 2,3,7,8-substituted) are very rarely found in human samples. This isomer has earlier been found in magnesium plant workers exposed to PCDFs[3].

We hope to be able to perform a follow-up study of this exposed family. Incidents in which humans have been exposed primarily by ingestion provides an opportunity to estimate half-lives for elimination of PCDDs and PCDFs. Particularly the youngest boy, whose isomer pattern is very different compared to the rest of the family, is very interesting.

References

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