PCDD AND PCDF LEVELS IN HUMAN ADIPOSE TISSUE IN FRANCE

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Introduction

Human fat tissue content in PCDDs/Fs from various parts of the world have been reported, either from people occupationally exposed or with no known exposure. In this paper we report the first results from France.

Sampling

Six patients of both sexes, aged 54-82, undergoing abdominal surgery in a Paris University hospital were sampled (after informed consent) while anaesthetized. One to twelve gram samples were taken from both parietal and epiploic fat tissues, collected in sterilized polypropylene vials and kept frozen at -20°C until analyzed.
All patients were asked on about their residence and about a possible previous exposure to chemicals, either occupational or off-time. All have been living in Paris for years; none experienced previous exposure to chemicals, except patient nr.3, a former tailor, who reported having been exposed to benzene before his retirement.

Analytical

Samples were defrosted , weighted and spiked with a mixture containing ten $^{13}C_{12}$ labelled PCDDs and PCDFs isomers. Labelled compounds were purchased from Cambridge Isotope Laboratories. Adipose tissues were torn or cut into small pieces with a scalpel blade, extracted with a mixture of acetone and hexane, then transferred in an extraction ampoule containing distilled water. Solvent extraction was continued. The water phase was discarded as the organic fraction was dried, then redissolved in hexane. The deproteinization was carried out under concentrated sulfuric acid. The hexane extract was washed, dried on sodium sulfate and cleaned up on neutral alumina (BIORAD AG7).
All phases were preliminary extracted with organic solvents , dried and conditioned at 220°C. Solvents were pesticide grade, glass distilled solvents from Burdick and Jackson.
GC/MS was performed on a VG 70-250 SQ system. The column used was a 50m long, 0.25mm i.d. DB5 column (J&W). 2µl of extract were injected in the splitless mode. The column outlet was directly introduced into the MS source. The mass spectrometer was equipped with a Electron Impact source. Acceleration voltage was 70eV. The mass resolution was set at 10 000. Chromatographic windows, chromatographic resolution and mass spectrometry sensitivity were periodically checked. The absolute observed detection limit was of the order of 10^{-14} g for 2,3,7,8-TCDD. 2,3,7,8 isomers were identified by the retention time of the peaks obtained from the analysis of the "dirty dozen" mixture.

Results

This study is the first survey carried out on French subjects. The persons sampled have been chosen to be - although of limited number - representative of the average Parisian population. No real difference was observed among results obtained on parietal and epiploic tissues.
On Table 1 are summarized the results of this survey.
The PCDDs and PCDFs distribution patterns are very similar from one patient to another (figure1). Nearly no pentachlorodioxin was found and very little hexachlorofuran. The only patient in whose tissue was detected pentachlorodioxin was the man exposed to benzene during his professional activity. On an average, PCDDs and PCDFs levels for that peculiar patient were slightly higher than levels found in the five other persons. This may suggest a relationship between the dioxin accumulation in fat and the benzene exposure.
Levels observed in French subjects adipose tissues are in the order of magnitude of those published in similar surveys carried on in Canada (1).
This study confirms the presence of a non zero background PCDDs and PCDFs level in humans in Paris, as was observed in other industrial countries, which is consistent with the environmental background PCDDs and PCDFs level found in a parallel environmental survey of the French capital.

References

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Figure 1: PCDDs and PCDFs distribution among Parisian patients adipose tissues (pg/g fat).

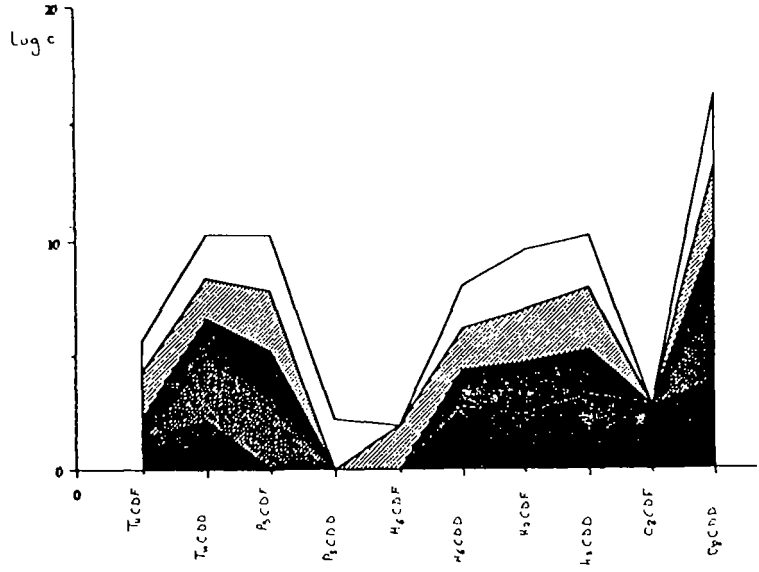

Table 1. Adipose tissue PCDD and PCDF levels in French patients. Isomer specific determination on fat basis.

Isomers	No of positive	Range (pg/g)	Mean value (pg/g)	sd (pg/g)
2,3,7,8-T_4CDF	7	2,4 - 12	5,8	4,1
other T_4CDFs	7	1,3 - 13,4	7,3	4,7
2,3,7,8-T_4CDD	6	2,9 - 23	10,3	7,9
other T_4CDDs	4	6,1 - 72,6	43,4	22,6
1,2,3,7,8-P_5CF	3	1,0 - 35,4	18,3	17,2
2,3,4,7,8-P_5CDF	8	19,3 - 242	105	94,1
1,2,3,7,8-P_5CDD	1		9,8	
other P_5CDDs	0			
1,2,3,4 7,8-H_6CDF	4	9,8 - 16,0	12,7	3,0
1,2,3,6,7,8-H_6CDF	3	9,8 - 14,4	11,5	2,5
1,2,3,7,8,9-H_6CDF	1		6	
2,3,4,6,7,8-H_6CDF	0			
other H_6CDFs	1		4,5	
1,2,3,4,7,8-H_6CDD	2	4,9 - 6,4	5,7	1,1
1,2,3,6,7,8-H_6CDD	7	28,6 - 61,6	46,7	10,3
1,2,3,7,8,9-H_6CDD	2	8,6 - 13,3	11,0	3,3
other H_6CDDs	0			
1,2,3,4,6,7,8-H_7CDF	2	16,2 - 103	59,7	61,5
1,2,3,4,7,8,9-H_7CDF	0			
other H_7CDFs	8	75,4 - 256	123	55,9
1,2,3,4,6,7,8-H_7CDD	7	80,4 - 232	164	55,9
other H_7CDD	0			
O_8CDF	0			
O_8CDD	8	362 - 887	624	189