# LEVELS OF PCDDS AND PCDFS IN HUMAN MILK FROM SPANISH AND FRENCH POPULATION

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## INTRODUCTION

Chlorinated dibenzo-p-dioxins (PCDDs) and chlorinated dibenzofurans (PCDFs) are two classes of organochlorine compounds which now appear to be widespread in our environment. Since these toxic materials are present in the environment, the question arise whether and what extend we are being exposed to them. One method of estimating exposure and bioavailability to people is to measure levels in human tissue.

Chlorinated dioxins and dibenzofurans have been reported in breast milk specimens from a number of countries in recent years, from people occupational exposed or with no known exposure. In this paper results obtained from Spain and France are reported and compared with those found in other countries.

## METHODS

Samples have been obtained from 15 and 13 volunteering French and Spanish mothers respectively. Mothers ages were between 25 and 40 years. All samples were collected in glass sterilized bottles and preserved at -18°C.

50 to 75 g samples were spiked with $^{13}C_{12}$ surrogate standards, mixed to methanol and then subjected to chloroform-hexane extraction. Fat content was determined by weighing. The lipidic compounds were dissolved in hexane and treated with concentrated sulfuric acid. The hexane phase was rinsed, dried and concentrated before clean up on activated neutral alumina.

HRGC/HRMS analysis was performed at 10,000 mass resolution on a VG 70-250 SQ GC/MS system equipped with and Electron Impact only source. Acceleration voltage was 30 eV. The column used was 60 m long, 0.25 mm i.d., o.25 $\mu$m film thickness DB5 column

(J&W), using helium as carrier gas. The 1,5 $\mu$l sample was splitless injected. Toxic isomers retention times, chromatographic windows, chromatographic resolution and mass spectrometry sensivity were periodically checked. The absolute detection limit was $10^{-14}$ g for 2,3,7,8 -TCDD. Quality criteria were defined, among which isotopic ratios and extraction-purification recoveries. The two major ions of the molecular ion cluster were monitored for each compound. Procedure blanks were carried for each set of samples analyses. Milk samples were individually analyzed.

## RESULTS

Results obtained in the milk sample analyses exhibited the same PCDD and PCDF distribution for all the Spanish and French mothers surveys.

On a fat basis PCDDs were higher in concentration than PCDFs with OCDD being the highest. Milk PCDDs contents were found decreasing from $H_7CDD$, $H_6CDD$, $P_5CDD$ to $T_4CDD$. PCDFs were more uniform in their congener distribution with levels of $P_5CDF$, $H_6CDF$ and $H_7CDF$ being of the same order of magnitude.

The comparison of PCDD/F content in human milk of both populations does not show important differences. 23478 $P_5CDF$ and the heptafurans are always more abundant in the French human milk samples, hexadioxins and hexafurans were higher in the Spanish samples. However, the differences found in the 23478 $P_5CDF$ content are really significant when the 2378 TCDD I-TEQ values were calculated for both populations.

The 2378TCDD I-TEQ values calculated for Spanish and French mothermilk samples were in the same order of magnitude of those published in similar surveys carried out in other countries[1-4]. Their values are lower than those found in Germany and Japan and higher than those found in the southern Vietnam and Pakistan.

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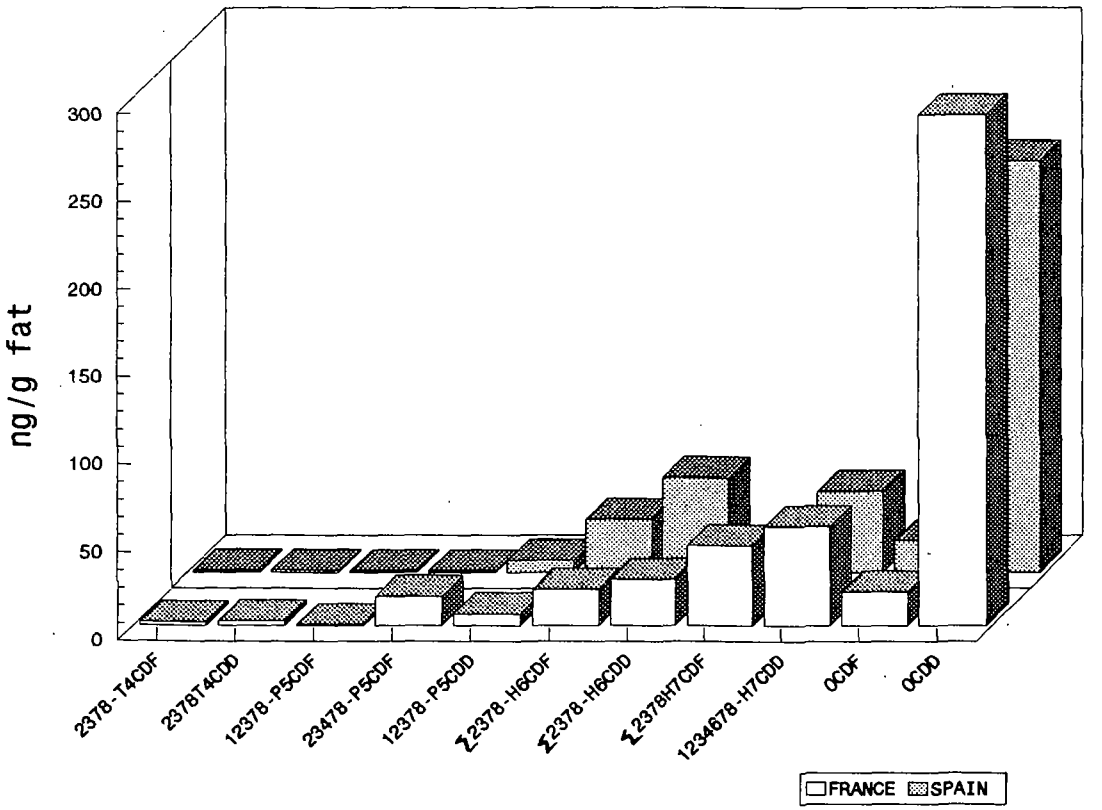
PCDD/F CONTENT IN HUMAN MILK FROM VARIOUS COUNTRIES (pg/g fat)

| SAMPLE | D.L. | FRANCE | SPAIN | GERMANY[1] | USA[1] | SWEDEN[2] | JAPAN[3] | VIETNAN Hanoi[1] | PAKISTAN[4] |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean±SD | Mean±SD | | | | | | |
| 2378-T4CDF | 0,4 | 1,8±0,8 | 1,02±1,2 | 2,0 | 2,9 | 2,0 | 3,1 | 2,1 | 1,2 |
| 2378-T4CDD | 0,4 | 2,4±1,1 | 1,2±1,9 | 3,0 | 3,3 | 3,0 | 7,1 | 2,2 | 3,3 |
| 12378-P5CDF | 0,4 | 0,5±0,4 | 0,7±0,9 | 0,7 | 0,5 | 0,0 | 0,0 | 1,0 | <4,3 |
| 23478-P5CDF | 0,4 | 16,5±5,2 | 0,9±2,1 | 24,0 | 7,3 | 17,0 | 28,0 | 6,0 | 6,5 |
| 12378-P5CDD | 0,4 | 6,6±1,8 | 6,7±8,6 | 9,3 | 6,7 | 7,0 | 5,6 | 2,8 | 5,2 |
| Σ2378-HxCDF | 0,4 | 20,4±23,1 | 30,0±9,6 | 16,4 | 10,6 | 7,0 | 10,0 | 8,6 | 11,2 |
| Σ2378-HxCDD | 0,4 | 25,9±7,0 | 53,6±14,6 | 46,1 | 41,7 | 38,0 | 49,9 | 8,9 | 20,8 |
| Σ 2378-HpCDF | 1 | 45,0±34,9 | 7,2±7,54 | 5,0 | 4,0 | 8,0 | 4,6 | 4,0 | 7,8 |
| 1234678-HpCDD | 1 | 56,0±22,1 | 46,0±31,7 | 46,0 | 42,0 | 57,0 | 71,0 | 11,0 | 40,7 |
| OCDF | 1 | 19,0±26,4 | 18,1±4,2 | 10,0 | 4,0 | 2,0 | 0,0 | 2,0 | 6,6 |
| OCDD | 1 | 290,0±129 | 234,0±44,8 | 185,0 | 233,0 | 268,0 | 1300 | 68,0 | 180,0 |
| | | | | | | | | | |
| I-TEQ | | 20.1 | 13.31 | 26.86 | 16.5 | 20,6 | 32.25 | 8,8 | 13,18 |

D.L. = Detection limit

# Figure 1

## PCDD/F content in Spanish and French human milk

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