

LEVELS AND PROFILES OF ORGANOHALOGEN COMPOUNDS (PCDDs, PCDFs, PCBs, DDE, DDT, DDD, HCB) IN ADIPOSE TISSUES OF ITALIAN OBESE PATIENTS

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Introduction

Humans are exposed to PCB, PCDD/PCDF compounds through environmental, occupational, accidental and dietary route^{1,2}. These contaminants accumulate in lipid tissue and, owing to both the toxicity and the long half-lives³ of several congeners, make it is important to determine their body burdens for risk evaluation^{4,5}.

During the present study, the concentration of 81 different congeners (58 PCB, 17 PCDD/PCDF, 4 coplanar PCB), HCB, DDE and DDT was measured in adipose tissue samples of nine obese individuals (7 women and 2 men). These subjects underwent bariatric surgery to achieve body weight loss. Since some studies demonstrated that body weight loss increases the plasma as well as the adipose tissue concentration of persistent micropollutants, it is interesting to know their initial levels in order to evaluate the exposure resulting from the weight loss.

In this paper the preliminary results obtained together with the congeners profiles of PCB, PCDD/PCDF, HCB, DDE and DDT are reported.

Materials and Methods

Table 1 reports sex, weight and height of the patients.

The abdominal adipose tissue samples were collected during bariatric surgery and kept, frozen at -20 °C until analysis.

Adipose tissue samples were homogenized with anhydrous sodium sulphate, transferred in ASE extraction cells and spiked with the a mixture of ¹³C₁₂ internal standards containing nine 2,3,7,8 substituted congeners of PCDD/PCDF, PCB 77, 126 and 169; unlabeled PCB 54 was also added.

The extraction was carried out by Dionex ASE 200 with a mixture of *n*-hexane/acetone 1:1 and the fat content determined gravimetrically. The extract was subdivided into two aliquots (A and B); the first one was used for the determination of dioxins and coplanar PCBs, whilst the in the second one the main PCB congeners and pesticides were determined.

The A aliquot (0.3590-6.2698 g fat) was eluted through a column containing sulphuric acid impregnated Extrelut to remove fat, and then purified with the automated multi-column Power-Prep system^{6,7}. The toluene fraction was concentrated and injected into an Autospec HRGC/HRMS system operating at 10.000 resolution.

The aliquot B (0.1183-0.1862 g fat) for the PCBs and pesticides determination was adsorbed on alumina, purified by means of a supercritical CO₂ fluid extractor (SFE Hewlett-Packard 7680T) and directly analysed by GC/LRMS^{8,9}.

HUMAN EXPOSURE II

Results and Discussion

The recoveries of the ^{13}C labelled internal standards added to samples varied between 70 and 117 % for PCB congeners and pesticides, whilst for the PCDD/PCDF varied from 50 to -102 %. The data on co-PCB are still in process. Total levels of PCDD and PCDF varied from 2.81 to 13.2 pg TE g fat; for total PCB from 77 to 456 ng/g fat; in Table 2 mean, minimum and maximum values for DDE, DDT, DDD and HCB are reported.

The PCB congener profiles in the nine humans adipose tissue were generally very similar to each other; a typical one is shown in Figure 1. In Figure 2 the PCB results of the present study are compared, for the major PCB congeners, to the results obtained by Chevrier et al.¹⁰ on abdominal adipose tissue of Canadian obese patients. Canadian patients show generally slightly higher PCB levels than Italians; contamination profiles are similar except for PCB 180, which displays higher values in the Italian patients.

In Figure 3 the mean PCDD/PCDF contamination profiles of female and male patients are compared: the main difference is observed in the relative ratio of 1,2,3,4,6,7,8-HpCDD; although the number of male patients in this study is very limited, we noticed the same profile also in one sample from a non obese male. At first glance there are no evident differences between male and female contamination profile for PCBs.

Table 1. Height, weight and sex of the patients

| N° | Sex | Height (cm) | Weight (Kg) | N° | Sex | Height (cm) | Weight (Kg) | N° | Sex | Height (cm) | Weight (Kg) |
|----|-----|-------------|-------------|----|-----|-------------|-------------|----|-----|-------------|-------------|
| 1 | WF | 154 | 137 | 4 | WF | 158 | 96,3 | 7 | WF | —* | 108,7 |
| 2 | WF | 159 | 114 | 5 | M | 185 | 122 | 8 | WF | 159 | 92,4 |
| 3 | WF | 170 | 170 | 6 | WF | —* | —* | 9 | M | 187 | 196 |

* data not available

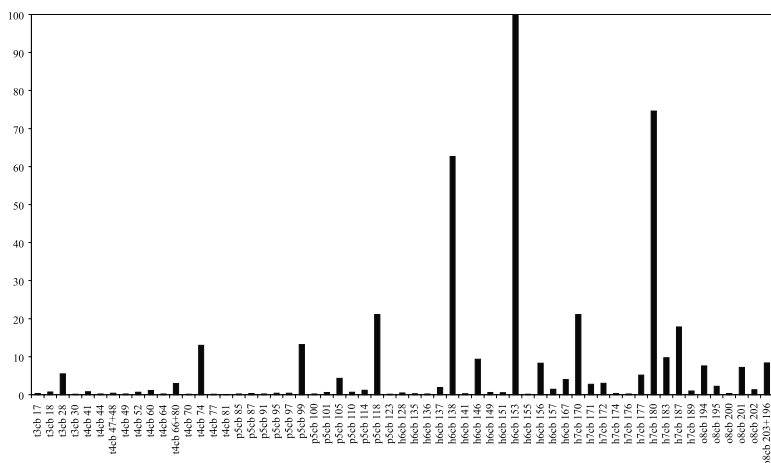


Figure 1. Typical PCB contamination profile (HxCB153=100)

Table 2. Chlorinated pesticide levels

| | Mean (ng/g fat) | Mim (ng/g fat) | Max (ng/g fat) |
|-----|-----------------|----------------|----------------|
| HCB | 82,9383 | 14,2 | 93,02 |
| DDE | 711,47 | 543,9 | 1878 |
| DDD | 6,10 | <0,109 | 110,9 |
| DDT | 343,74 | 8,08 | 432,9 |

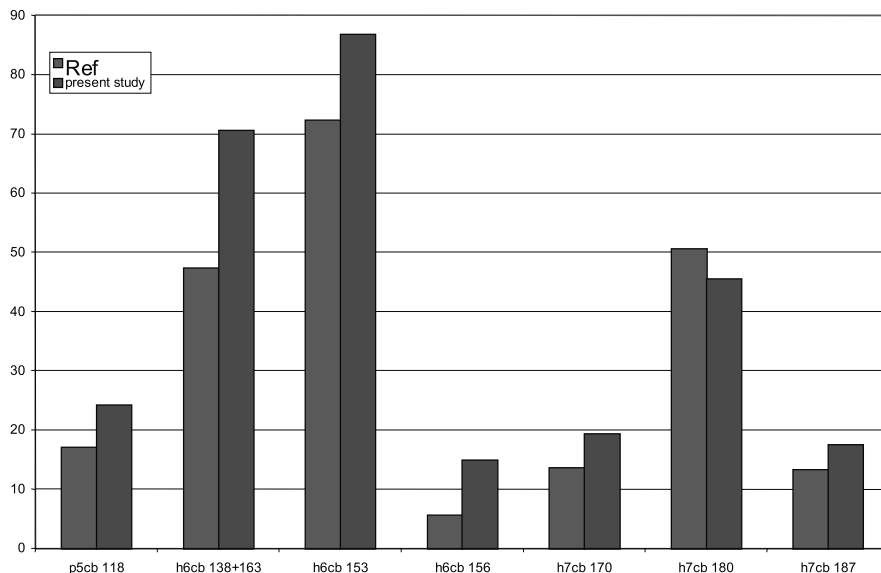


Figure 2. Major PCB congeners (ng/g fat) in Italian and Canadian (Ref .10) patients.

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HUMAN EXPOSURE II

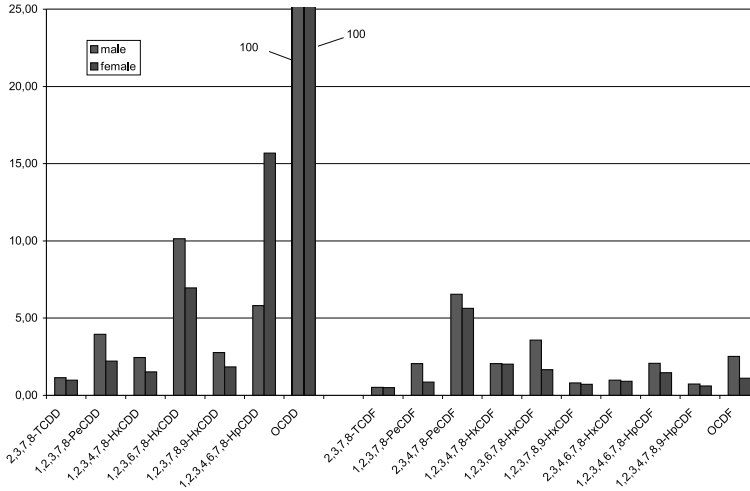


Figure 3. Male and female PCDD/PCDF contamination profiles (OCDD=100)

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