# HUMAN EXPOSURE II -POSTER

## DISTRIBUTION OF ORGANOCHLORINE PESTICIDES IN KOREAN TISSUES

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## Introduction
Persistent organochlorine pesticides has been used intensively in agriculture for a long time. The occurrence of organochlorine pesticides in the environment and subsequently in parts of the food chain, resulting in the intake of these compounds by man and animal. The measure of the levels of organochlorine pesticides in tissues or blood of human populations are good markers in determining the extent of exposure and in the evaluating the hazards. So, most countries have conducted initial monitoring programs to determine organochlorine pesticides and polychlorinated biphenyls in human tissues. But no report has been presented in Korea. In this study, α-BHC, β-BHC, γ-BHC, δ-BHC, p,p'-DDT, p,p'- DDD, p,p'-DDE, endrin, dieldein and aldrin were determined in human blood, brain, adipose tissue, kidney cortex and liver tissues collected at autopsy of 10 men and 10 women.

## Materials and Methods
*Samples*
Human tissues(liver, kidney cortex, cerebrum, fat and whole blood) were collected from the cadavers in the region of urban and agricultural district.
*Standards*
The standards of α-BHC, β-BHC, γ-BHC, δ-BHC, p,p'-DDT, p,p'-DDD, p,p'-DDE, endrin, dieldein and aldrin were from Dr.Ehrenstorfer GmbH (Germany) and organic solvents such as, n-hexane, acetonitrile, ether, were for organic residue analysis.
*Instruments*
The Varian star 3400cx gas chromatograph equipped with electron capture detector was used for the analysis of organochlorine pesticides. DB-1(30m x 0.25mm, film thickness 0.25μm) and Rtx-5(30m x 0.32mm, film thickness 3 μm) capillary columns were used gas chromatographic separations.
The oven temperature for the analysis of organochlorine pesticides were
  DB-1

$$8°C/min \qquad\qquad 15°C/min$$
150°C(2min) ------------ 240°C(2min) ------------ 280°C(10min)


  Rtx-5
$$8°C/min$$
220°C(1min) ------------ 280°C(27min)
The temperatures of Injector and Detector were 280°C and 300°C, respectively.
*Analytical procedures*
The method used involved extraction of organochlorine pesticides in different tissues, purification

of the sample using florisil column chromatography, and identification and quantification of the compounds via gas chromatograph equipped with electron capture detector(GC/ECD). One $\mu\ell$ of the final extract solutions of each sample were injected onto the GC-capillary column(DB-1) under the mentioned conditions. The identification of each components were done on the basis of retention times. The results were confirmed using a second capillary column(Rtx-5). Residue amounts were determined by internal standard method. And recovery tests added to the fat, liver and blood were also performed

**Results and Discussion.**
Recoveries of organochlorine pesticides added to liver were ranged from 92.0%($\delta$-BHC) to 126.0%(p,p'-DDT), added to adipose tissue were 91.9%(aldrin)~121.0%($\delta$-BHC). And in blood the recoveries were 79.5%(dieldrin)~116.3%(p,p'-DDT). Human tissues collected from the autopsy were 10 men and 10 women, 16-65 years of age (Table 1). Endrin and aldrin were not detected in all samples tested. p,p'-DDE was detected in all samples of adipose tissue and liver in the range of 0.0217~0.8987 µg/g lipid weight basis, 0.0341~0.3038 µg/g lipid weight basis, respectively. No significant difference was found in the levels of organochlorine pesticides between sexes, districts and ages. Table 2 shows correlation between tissues for p,p'-DDE and $\beta$-BHC of 20 autopsies. Adipose tissue concentrations of p,p'-DDE residues were found to be correlated (P<0.01) with the concentrations of p,p'-DDE in blood (Pearson's correlation coefficient=0.610) and cerebrum(Pearson's correlation coefficient=0.568). The levels of organochlorine pesticides in Korean human tissues were relatively lower than those of other countries(Table 3), but we could know that organochlorine pesticides have been widely distributed in Korean human body.

Table 1.Distribution of Age and Gender of Individual Subjects

| Age group | Female | Male | Total |
|---|---|---|---|
| Teens | - | 1 | 1 |
| Twenties | 4 | 3 | 7 |
| Thirties | 5 | 2 | 7 |
| Forties | - | - | - |
| Fifties | | 2 | 2 |
| Sixties | 1 | 2 | 3 |
| Total | 10 | 10 | 20 |

Table 2. Correlation between tissues for p.p'-DDE and $\beta$-BHC of 20 autopsies.
(Frequency > 50%)

| Pesticide | Tissues | r value | p value |
|---|---|---|---|
| p,p'-DDE | Adipose tissue/Blood | 0.610 | <0.01 |
| p,p'-DDE | Adipose tissue/Brain | 0.568 | <0.01 |
| p,p'-DDE | Kidney cortex/Brain | 0.488 | <0.05 |
| $\beta$-BHC | Adipose tissue/Liver | 0.446 | <0.05 |

Table 3. Mean concentration of $\beta$-BHC, p,p'-DDT and p,p'-DDE in human adipose tissues from various countries(unit : µg/kg lipid weight basis).

| Country | Year | $\beta$-BHC | p,p'-DDT | p,p'-DDE | References |
|---|---|---|---|---|---|

| Canada | 1991-1992 | 40 | NA | 765 | Dewailly et. al., 1994 |
|---|---|---|---|---|---|
| Italy | 1989 | 213 | 64 | 395 | Gallelli et. al., 1995 |
| Iran | 1991-1992 | 728 | 190 | 2,450 | Burgaz et. al., 1995 |
| Spain | 1991 | 1,530 | 400 | 3,930 | Gomez-Catalan et. al., 1995 |
| USA | 1994-1996 | 37 | 28 | 913 | Stellman et. al., 1995 |
| Vietnam | 1991 | 30[a] | | 4,900[b] | Nakamura et. al., 1994 |
| Mexico | 1997-1998 | 143 | 1,224 | 4,355 | Waliszewski et. al., 1999 |
| Japan | 1986-1987 | 1,800[a] | | 2,400[b] | Kashimoto et. al., 1989 |
| Korea | 1994-1995 | 190[a] | | 1,100[b] | Kang et. al., 1997 |
| Korea | 2000 | 23 | 27 | 153 | This study |

a : α-BHC+β-BHC+γ-BHC,  b : p,p'-DDE+p,p'-DDT+p,p'-DDD
NA : not available

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## THE IMMUNE SYSTEMS' CONDITION IS A INDEX OF THE EARLY REACTION ON ECOTOXICANTS' POLLUTION

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### Introduction.
The increasing number of perinatal disorders indicate upon the environmental pollution and it's harmful effects on a pregnant women which is shown to be the most sensitive for that. We have studied the peculiarity of pregnancy, delivery and immune status in 146 pregnant woman with mature pregnancy (group I) living in large industrial city (Ufa is a capital of Bashkortostan Republic, a city with well developed chemical industry and net of main line). Environment is polluted with different agents, especially with dioxins influencing on the health of population. Immune system responds to xenobiotics first. Fifty one women living in rural areas without high concentrations of pollutants (dioxins, phenols) in their environment were taken as controls.

### Methods and Materials.
Test of the $1^{st}$ and the $2^{nd}$ levels have been used for studying the immune status. We have measured the absolute and relative numbers of lymphocytes, T- and B- lymphocytes. Functional activity of neutrophiles was evaluated by phagocytosis level, phagocytic number and NST-test. Identification of populations and subpopulations of lymphocytes has been made. For humoral immunity study we have measures the CIC levels and content of Ig G, Ig A and Ig M in blood serum.
Cyto- and morphological studies of placenta have been performed. All standard clinical methods of examination of pregnant woman and newborn have been used.

### Results and Discussion.
Mean age of pregnant woman, obstetrical and somatical anamnesis did not differ in two groups.
The frequency of complications of the second half of pregnancy in tested group ($32,8 \pm 3,8\%$) was higher than in controls ($14,4 \pm 4,9\%$; $p < 0,05$). The risk of premature delivery in tested group ($23,97 \pm 3,5\%$) was significantly higher in comparison with controls ($7,84 \pm 3,7\%$; $p < 0,05$).
The states of a fetuses calculated using Fischer 's score in the main group were worse than in controls ($6,6 \pm 0,1$ and $7,27 \pm 0,15$; $p < 0,001$). That caused a big number of infants from group I born in asfyxia (Fig.1.). Apgar-scale marks on the $1^{st}$ minute in tested group ($6,34 \pm 0,1$) was significantly lower in comparison with controls ($6,74 \pm 0,14$; $p < 0,05$).
Morphological study showed predominantly destructive type of placenta in $43,1 \pm 4,0\%$ woman of the tested group ($27,4 \pm 6,2\%$ in controls; $p < 0,05$).