

### EVALUATION OF DIOXIN CONTAMINATION IN MATERNAL AND FETAL SERUM TO STUDY FETOMATERNAL DYNAMICS OF ENVIRONMENTAL ENDOCRINE DISRUPTORS.

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#### Introduction

In Japan, like other industrialized countries, dioxin contamination is a serious public problem now. 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) and these compounds are resistant to degradation and are ubiquitous environmental pollutants that become concentrated in animal tissues, climb the food chain, accumulate in adipose tissue and are excreted in breast milk in large amounts. It is well known that maternal blood dioxin level decreases through pregnancy, delivery, and lactation<sup>1</sup>, but little is known whether and to what extent fetuses are exposed to dioxins through their transplacental transfer. Present study was performed to determine the dioxin levels in maternal and fetal circulation to elucidate the dynamics of fetomaternal endocrine disruptor contamination.

#### Materials and Methods

##### *Determination of dioxin levels*

Dioxin levels in these samples were examined using the high resolution gas chromatograph-mass spectrometer after Soxhlet extraction method as previously described. The concentrations of dioxin, including 17 of PCDDs and PCDFs were expressed in the toxic equivalent quantity (TEQ) of 2,3,7,8-TCDD (tetrachlorodibenzo-p-dioxin), or pgTEQ/g fat.

##### *Maternal blood sampling*

Two hundred cases of pregnant Japanese women who underwent full-term and normal vaginal delivery (100 cases of primipara and 100 cases of 1 para) were subjected to the present study with informed consent. In both groups, the women's average age and socioeconomic status were matched. Maternal blood sampling was done in the first (~13 weeks of gestation) and the third trimester (27~36 weeks). The samples were frozen immediately and stored at -20°C prior to analysis. No woman had a history of abortion.

##### *Umbilical cord blood sampling*

Thirty cases of pregnant women (full-term and normal vaginal delivery, 10 cases of

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primipara, 10 cases of 1 para and 10 cases of 2 para) were subjected. Umbilical cord blood was collected at the delivery. The samples were frozen immediately and stored at  $-20^{\circ}\text{C}$  prior to analysis. No woman had a history of abortion.

### Results

Maternal blood dioxin concentration seemed to be higher in the primipara than in the para not only in the first trimester (43 vs. 27 pgTEQ/g fat), but also in the third trimester (39 vs. 25 pgTEQ/g fat) although the maternal age was not significantly different (28.5 vs. 28.9 years old for primipara vs. 1 para respectively) (Figure 1). In the same pregnant women, moreover, dioxin concentrations seemed to be slightly higher in the first trimester than in the third trimester (Figure 1).

In the umbilical cord, the dioxin levels seemed to be decreased as the parity was increased (79.2 vs. 62.1 vs. 39.3 pgTEQ/g fat for primipara vs. 1 para vs. 2 para, respectively) although the maternal age was not significantly different (28.5 vs. 29.1 vs. 29.1 years old for primipara vs. 1 para vs. 2 para, respectively) (Figure 2). Neonatal body weight was not significantly different (3,156 vs. 3,154 vs. 3,220 grams for primipara vs. 1 para vs. 2 para, respectively).

### Conclusions

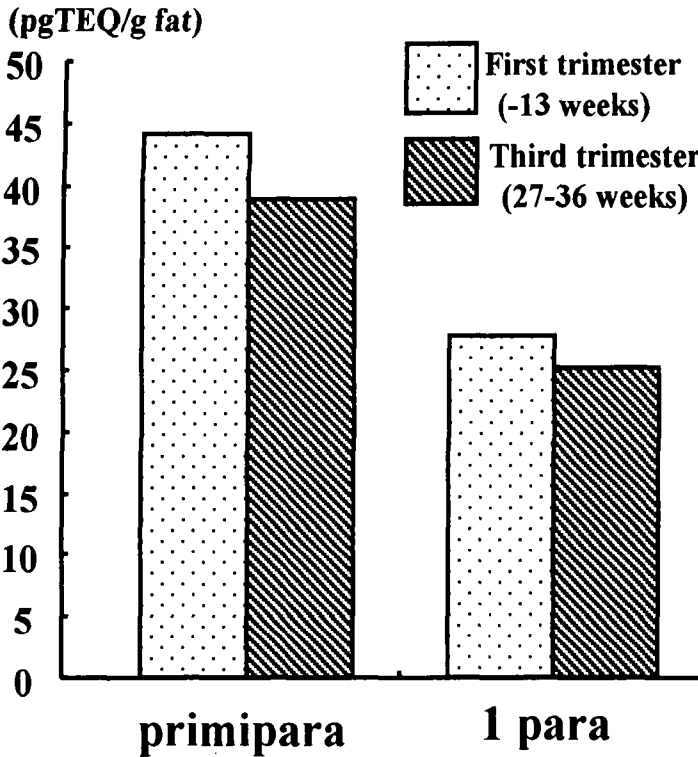
1) Dioxins were detected both maternal and fetal circulation. 2) Dioxin levels in both maternal and fetal serum in the primipara were higher than those in the multipara. 3) Maternal blood dioxin levels appeared to be slightly higher in the first trimester than in the third trimester, which may suggest the presence of transplacental transfer of dioxin. 4) Lactational transfer of dioxin may play a main role in reduction of dioxin contamination in pregnancy. It may be important to elucidate the possible effects of dioxins on reproductive function such as pregnancy, delivery and lactation.

### Acknowledgment

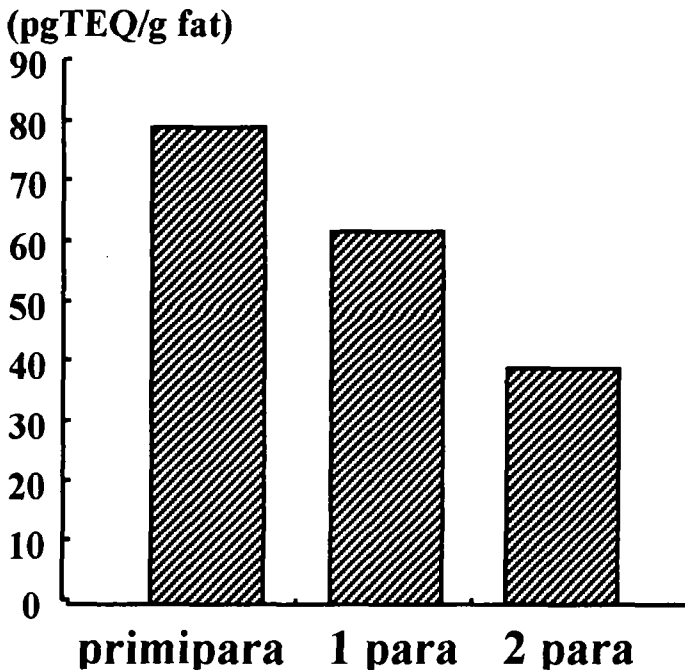
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### References

1. Abraham, K., Papke, O., Gross, A., Kordonouri, O., Wiegand, S., Wahn, U. and Helge, H. (1998) *Chemosphere* **37**, 1731-1741.
2. Tsutsumi, O., Uechi, H., Sone, H., Yonemoto, J., Takai, Y., Momoeda, M., Tohyama, C., Hashimoto, S., Morita, M. and Taketani, Y. (1998) *Biochem Biophys Res Commun* **250**, 498-501.



**Figure 1**  
Comparison of dioxin concentration in maternal blood between primipara and 1 para, and between the first (-13 weeks of gestation) and the third trimester (27-36 weeks). Each value is determined on a sample consisting of equal amount (0.5 ml) of sera obtained from 100 pregnant women. No women had a history of abortion.



**Figure 2**  
Comparison of dioxin concentration in umbilical cord blood among primipara, 1 para, and 2 para. Each value is determined on a sample consisting of equal amount (5 ml) of sera obtained from 10 fetuses. No women had a history of abortion.