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HUMAN EXPOSURE TO PBDD/F AND PBDE

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Polybrominated diphenyl ethers (PBDEs) is one of the main types of brominated flame retardants (BFRs) and widely used in plastics, textiles, paints and electronic appliances. In Japan the domestic use on BFRs increased 3.4-fold from 20,000 tons in 1986 to 67,250 tons in 2000. The PBDEs might be released into the environment during production, use and disposal. Particularly, since the report on drastic increase of PBDE concentrations in human milk from Sweden during 1972- 1997, monitoring for temporal trends of PBDE were carried out in other countries. On the other hand, PBDD/F congeners have been identified in the process of thermal degradation of BFRs including PBDEs or in the flue gas and fly ashes from MSWI. The present study aimed to determine and compare concentrations of PBDD/F and PBDE congeners including chlorinated dioxins and DLPCBs from general Japanese adipose tissues collected in 1970 and 2000.

Human adipose tissues around the Tokyo area in Japan were collected in 1970 (n=10) and 2000 (n=10) from hospital with permission. Fat samples were homogenized with sodium sulfate and extracted with dichloromethane in a Soxhlet. After clean up, analyses of PBDEs and PBDD/Fs were performed on an HRGC-HRMS using an HP6890-GC connected to mass spectrometer, a JMS 700K (JEOL, Japan) with SIM mode. The analyses were run on a fused silica column DB5-HT (15m×0.25mm i.d., 0.1 μ m film thickness) from J&W Scientific (USA).

2,3,7,8-TeBDF was detected above the LOQ in all the 1970 and 2000 samples and the concentration range observed in the former are in the same range as the latter group. Concentration of TeBDD and total PBDD/Fs in 1970 were significantly higher than that of 2000, even though small sample size. Still but, we do not have the explanation on human occurrences of PBDD/Fs. The median PBDE concentrations in 1970 and 2000 were 29.2 and 1288 pg/g fat, respectively. This may indicate that human exposure to PBDE in Japan increased during 1970-2000, considering the historical domestic use on PBDEs in Japan. Of the seven PBDE congeners, the only congener found in all the 1970 samples was BDE-47 (2,2',4,4'-TeBDE) and contributed 56.2% to the sum PBDEs, whereas elevated contribution of the BDE-100 (2,2',4,4',6-PeBDE, 19.4%) and BDE-153 (2,2',4,4',5,5'-HxBDE, 29.7%) was comparable to that of BDE-47 (35.6%) in 2000 samples. BDE-183 (2,2',3,4,4',5',6-HpBDE) was found 76 pg/g fat only in the 2000 samples. As far as we know, this is the first report on the presence of the PBDD/F congener from the adipose tissue of general Japanese people.