

Time Trends of PCDD/F and Coplanar PCBs in Japanese Human Adipose Tissue - Comparison of 1970-71, 1994-96 and 2000

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Polychlorinated dibenzo-*p*-dioxins (PCDDs), dibenzofurans (PCDFs) and coplanar biphenyls (Co-PCBs) are ubiquitous and persistent environmental contaminants. Humans are exposed to PCDD/F and coplanar PCB compounds, through environmental/background, occupational or accidental exposure, and background exposures may result in disease even if the incidence is low. A decreasing trend of concentrations of PCDD/Fs and coplanar PCBs in Japanese people seemed less certain and there is no available data to measure a time trend for human adipose tissue compared to sediment core monitoring, which shown a gradual decreases of PCDD/Fs and coplanar PCBs. The objectives of the present study were to determine the concentrations of PCDD/Fs and coplanar PCBs in adipose tissue of Japanese adult collected in 1970-71, 1994-96 and 2000, and to assess the temporal trends of the concentrations of these compounds and toxic equivalents (TEQs).

Human adipose tissues from the Kanto area in Japan were collected in 1970-71, 1994-96 and 2000 and frozen at -20°C until analysis. 1 to 3g of the fat samples were homogenized with sodium sulfate and extracted with dichloromethane in a Soxhiet apparatus. The extract was treated with sulfuric acid and further clean up was made using silica gel and an carbon column. Instrumental analysis was performed on a HRGC-HRMS (HP6890-JMS 700D, JEOL co.) with SIM mode. After data acquisition, the selected ion chromatograms were integrated and calculated using a DioK data system (JEOL co.).

Temporal trends for TEQs using WHO-TEF₁₉₉₈ seemed to increase from the late 80s to the mid-90s when compared to 1970-75. This may indicate changes of sources; the domestic ban on PCP and PCBs in the 1970s and an increase in other source such as unidentified or small-scale incinerations. However, we have no information on unique source identifications and there is still a lack of data on 80s Japanese exposure. In addition, the increase of TEQ during the 70s and 80s is not explained. In other countries such as Germany, a similar drastic TEQ reduction of 50-70% was reported for human blood during 1980-1999, as well as in other European countries and the USA. Time trends for TEQs of co-PCBs with other Japanese studies, there are significant decreases in PCB-TEQs during 1970s - middle of 1990s. However, temporal trends for the last 5 years are still not clear. Furthermore, there are dozens of tons of banned-PCB formulations in closed systems still operating or being kept in Japan, and their possible improper leakage to the environment is a matter of concern. Therefore, there is a need for research on the source characterization and for continuous monitoring of short-term temporal trends on background exposure to coplanar PCBs as well as to PCDD/F.