Double Blind Comparison of TEQ Determinations by the DIPS-CALUX® Bioassay and HRGC/HRMS in Human Blood and Adipose Tissue

F. Kayama[1], A. Hamamatsu[2], K. Sagisaka[2], D. Brown[3], T. Suzuki[4], and G. Clark[3]

1 Jichi Medical School, Tochigi 329-0498 Japan
2 Tokyo Medical Examiner's Office Otsuka, Tokyo 112-0012, Japan
3 Xenobiotic Detection Systems, 1601 East Geer Street, Durham, NC 27704
4 Hiyoshi Corporation, Omihachiman, 523-8555, Japan

This double-blind study was designed to validate the usefulness of the Dioxin/Furan and PCB specific (DIPS) CALUX® bioassay versus High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) for estimating TEQ contamination of human blood and adipose tissue. Twenty-one samples of adipose tissue were obtained from autopsy victims in the city of Tokyo, Japan and vials of adipose distributed to the Hiyoshi Corporation for performance of the DIPS-CALUX bio-analysis and also sent to the Shimazu TechnoResearch Company for performance of TEQ determinations by HRGC/HRMS. Whole blood was collected from volunteers at the Jichi Medical School of Japan and 20 ml sent for DIPS-CALUX analysis and 50 ml sent for HRGC/HRMS analysis. The analysis of adipose tissue for polychlorinated dibenzo-dioxins (PCDD) and furans (PCDF) and polychlorinated biphenyls (Co-PCB) demonstrated a mean of mean value of 42.5 pg TEQ/g fat, (median: 33 pg-TEQ/g fat, range 18.5-83.8). There was a good correlation (R= 0.8675) between TEQ measured by the DIPS-CALUX® bioassay and HRGC/HRMS. The measurement of TEQ in 17 whole blood samples also demonstrated good correlation (R = 0.7333) between the DIPS-CALUX® bioassay and HRGC/HRMS. These data demonstrate that the DIPS-CALUX® bioassay should be useful for epidemiological studies of exposure to dioxin-like chemicals. The DIPS-CALUX® bioassay has the advantage that it is rapid and less costly than HRGC/HRMS analysis.