Polychlorinated Terphenyls in the Human Fat

by

M. Doguchi, S. Fukano, and F. Ushio

Department of Food Hygiene and Nutrition
Tokyo Metropolitan Research Laboratory of Public Health
Tokyo, Japan

Few reports about polychlorinated terphenyls(PCT) persistent in the environment have been so far made. (ZITKO 1972) also personal communication from M.UEDA and K. MINAGAWA.

The distribution and concentration of PCT in the environment is still obscure. This pollutant is thought to be eventually accumulating in the human body through a food chain and/or other routes. The detection of PCT in the human fat is described in this paper.

Twenty samples of the human adipose tissue, 6 males and 14 females, obtained from the hospitals in Metropolitan Tokyo from 1971 to 1972 were subjected to the analysis.

About 0.2g of the fat extracted from the tissue was dissolved in 8 ml of hexane, then shaken thoroughly with 8 ml of fuming sulphuric acid (10% sulpher trioxide). After centrifugation the sulphuric acid layer was frozen by dipping the reaction tube into a carbon dioxide ice bath. The hexane layer was ready for injection into the gas chromatograph. With some samples, additional sulphuric acid treatment would be required to clean them up satisfactory. The column used for GLC consisted of 2% OV-1 on gas chrom Q 80/100 and operated at 270°C.

The peak profile in the chromatogram of the samples was similar to that of Kanechlor C (KC-C), a technical PCT produced by Kanegafuchi Chemical Industry Co. in Japan. PCT residue in the sample fat was quantified by comparison of the total peak height of the 10 major peaks given by KC-C and those given by the samples (Fig. 1).

The chlorination of KC-C with $SbCl_5$ in sealed glass tubes for 2 h at 240°C yielded the three peaks as shown in Fig. 2. The peak 1,2 and 3 in the figure consisted

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of perchlorinated m-, p- and o-terphenyl respectively. Identical peaks were obtained from similary treated sample fat. The column packed with Dexsil 300GC was used for GLC in this case and operated at 280°C.

All the samples examined were shown to contain substantial quantities of PCT. The average concentration of PCT in these samples was 0.6 ppm on fat basis with a range of 0.1 ppm to 2.1 ppm.

It has been shown that the average concentration of PCT in human fat is 0.29 ppm with 33 samples ranging from 0.03 ppm to 1.0 ppm in Kochi prefecture by Ueda (2), and 0.39 ppm with 10 samples in Nigata prefecture by Minagawa (3).

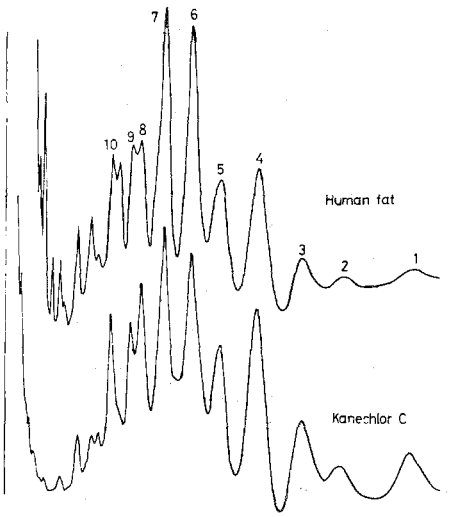

Fig. 1. Gas chromatogram of PCT residue in human fat.

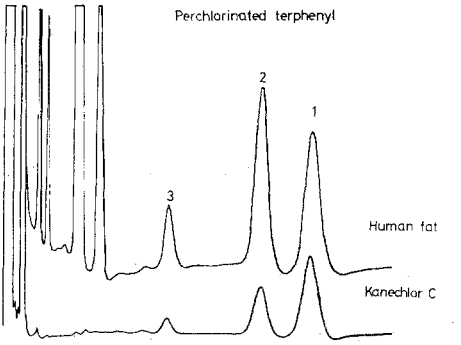

Fig. 2. Gas chromatogram of perchlorinated terphenyls.

References

1. ZITKO, V., Bull. Environ. Contam. Toxicol. 7, 200 (1972).