Absence of Polychlorinated Biphenyls in Human Milk and Serum from Texas and Human Milk from New Guinea

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Polychlorinated biphenyls (PCB's) are chemicals used in industry as plasticizers and in the manufacture of electrical insulators, varnishes, paints, lubricants, heat transfer fluids, and other products. Both PCB's and DDE are apparently the most abundant of the chlorinated hydrocarbon pollutants in the global ecosystem (1). In general, the amount of PCB's found in animal tissues tends to parallel that of DDE, although the DDE/PCB ratio is lowest near industrial areas, as would be expected (2). Although PCB's have been identified in fish, wildlife, and the environment, their presence or absence in human tissue is virtually unknown. Risebrough, in a personal communication to the Commission on Pesticides and Their Relationship to Environmental Health in 1969, indicated that both pooled human milk and 8 individual human milk samples from California were "positive for PCB." (3) The purpose of the present study is to investigate the degree of human contamination by PCB's by assaying human milk and serum from an industrialized society (Texas) and human milk from a, until recently, stone age culture (New Guinea natives).

METHODS

Seventy-nine lactating women were the subjects of this study. Thirty-two were from a variety of native villages in New Guinea , and 47 were from three cities in Texas: 24 from El Paso, a city with light industry in a semi-arid farming and ranching area; 16 were from McAllen, a small city in an agricultural area 1,000 miles down the Rio Grande River from El Paso; and 7 were from Houston, a heavily industrialized city 300 miles from McAllen. The El Paso samples were from U. S. Army soldiers' wives who characteristically have come from all parts of the country. Breast milk samples were obtained by manual expression into a chemically clean glass container and then kept frozen until the time of assay. Twenty-eight subjects from Texas had

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serum samples drawn the same time that the milk was obtained, and this was frozen in glass until the time of assay. The women who had both serum and milk samples assayed are being reported separately in a study concerned with the relationship between serum and milk levels of insecticides (4).

2 ml. samples of blood serum (5) and milk (6) were extracted with hexane. The blood extract was concentrated to the desired volume and injected into the gas-liquid chromatograph (GLC); the milk, however, needed Florisil clean-up prior to concentration and injection into the GLC. Analyses were accomplished with a MicroTek 220 gas chromatograph equipped with a tritium foil detector. Columns used were 1.5% OV-17 and 1.95% QF-1 on Chromosorb W 100/120 mesh H.P., and 4% SE-30 6% QF-1 on Chromosorb W 80/100 mesh H.P. Temperatures for the GLC were as follows: column temp. 200° C; inlet temp. 225° C; detector temp. 205° C. Results were confirmed in conjunction with thin-layer chromatography. These parameters of the GLC were set up to give us a sensitivity of 1 part per billion of p,p'-DDT. This standard was used as there is a variety of PCB's available in this country, each one having its own sensitivity on the GLC.

RESULTS AND DISCUSSION

Despite the detection of chlorinated hydrocarbon insecticides in all of the Texas samples, no PCB's were detected in either the milk or the serum. Neither were any detected in the milk from New Guinea natives, although DDT and DDE were detected in all but one of them. The lack of other insecticides in these latter samples can be attributed to the exclusive use of DDT in malaria-eradication programs.

Because PCB's are lipid soluble we could assume that if they were present in the human body in detectable amounts, they could be recovered from lipid containing tissue such as milk or serum. Their total absence from these samples would suggest that although PCB's are widespread industrial pollutants of our ecosystem, they are not yet significantly contaminating humans.

SUMMARY

Seventy-nine lactating women from New Guinea and Texas had their breast milk assayed for the presence of polychlorinated biphenyls (PCB's), a widespread industrial pollutant of the ecosystem. Twenty-eight of these women had serum samples assayed for PCB's also. No PCB's were detected in any of the samples.

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