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MORBIDITY AND MORTALITY WEEKLY REPORT

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Epidemiologic Notes and Reports

Polychlorinated Biphenyl Exposure – Indiana

In January 1976, high concentrations of polychlorinated biphenyls (PCB) were found as contaminants in municipal sewage sludge used by residents of Bloomington, Indiana, for garden fertilizer. The source of the PCB was attributed to an electrical manufacturing firm in Bloomington, which had used PCB as a dielectric in the production of capacitors and had discharged PCB into the city sewage system. Fourteen sludge samples had a mean PCB concentration of 479.1 parts per million (ppm) (range, 0.1-1,700 ppm), and 28 samples of sludge-treated soil had a mean PCB content of 17.1 ppm (range, 0.1-107 ppm).

To evaluate the possible health effects of PCB exposure, the Monroe County Board of Health and CDC conducted epidemiologic and clinical evaluations on 3 groups: (1) a small group of workers (principally capacitor workers) exposed occupationally to PCB, (2) the workers' families, and (3) community residents who had applied sludge to their gardens.

Serum levels of PCB were found to be highest in th 18 workers exposed occupationally to PCB (mean 71.7 parts per billion [ppb]; range 18-357 ppb). Previous studies of population groups in the United States (*1,2*) and in western Europe (*3*) without occupational or other unusual exposures to PCB have shown mean serum PCB levels of 5-20 ppb with 99% of values being less than 30 ppb. Nineteen members of workers' families had a mean serum PCB concentration of 33.6 ppb (range 12-164 ppb). Ninety-one community residents who had been exposed to sewage sludge had a mean PCB concentration of 17.8 ppb while 23 without sludge exposure had a mean level of 23.8 ppb. Serum PCB levels showed no correlation with number of years of sludge use, total pounds used, or interval since last use. Forty-five (49%) of the 91 sludge users evaluated had applied sludge to their gardens no more than twice. Since heavy consumption of fresh water game fish has previously been associated with elevation in serum PCB levels (*1*), histories of fish consumption were taken, no correlation was noted.

Because alteration in hepatocellular function has been reported in human and animal studies of PCB exposure (*4*), a battery of 6 liver function tests was conducted on 43 adult subjects. Serum levels of the liver enzyme gamma glutamyl transpeptidase (GGTP) increased significantly with serum PCB concentrations ($r=0.21$; $p<0.05$). This correlation was independent of age in adults (>21 years) and was strengthened by the exclusion from analysis of alcohol drinkers ($r=0.42$; $p<0.0001$). No correlations were observed between serum PCB levels and the results of other less sensitive liver function studies.

Plasma triglyceride levels have previously been found to be elevated in persons exposed to PCB (*5*). The apparent mechanism for this elevation is a PCB-induced impairment in the hepatic enzymes which regulate removal of circulating lipoprotein from plasma. In this study 10 fasting adults who were found to have triglyceride levels above the 90th percentile for age, sex, and race (mean triglyceride=279.9 mg/100 ml) had a mean serum PCB content of 65.0 ppb. Plasma triglyceride concentrations increased significantly with increases in serum PCB levels ($r=0.35$, $p<0.003$). In adults this association was independent of age.

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Editorial Note: Both the manufacture and the use of PCB in the United States have decreased sharply in recent years with recognition of the compound's toxicity and potential for long persistence in the environment. Despite this decreased production, persons exposed to PCB deserve evaluation because the compound, once absorbed, is excreted and metabolized very slowly and because the delayed effects of exposure to PCB are still largely unknown.

No evidence was found in this investigation to indicate that exposure to PCB-contaminated sewage sludge, applied as fertilizer, resulted in increased absorption of PCB. Nevertheless, the lack of a demonstrable association in this study between serum PCB levels and exposure to PCB-contaminated sludge must be interpreted cautiously, since the majority of sludge users in Bloomington had relatively brief exposure to PCB. Sewage sludge and wastewaters, particularly those from industrial sources, have been shown to contain numerous toxic contaminants, among them heavy metals (*6*), persistent pesticides, and other halogenated hydrocar

Attachment 2-6

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Polychlorinated Biphenyl Exposure – continued

bons. It has been postulated that the repeated application of partially treated sewage containing these materials to crop and grazing lands could lead ultimately to the accumulation of toxic chemicals in human foodstuffs (*7,8*).

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International Notes

Infant Botulism – England

England has reported its first recognized case of infant botulism. Clinical and laboratory features of the case are as follows.

The patient, a 5-month-old breast-fed female, had been introduced to home cooked and commercial solids in December. Her development was normal until December 31, 1977, when she had onset of constipation. Over the next 10 days, she became irritable, developing generalized weakness so that she was unable to suckle and tended to choke when spoon fed. When admitted to the hospital on January 11 she was lethargic and had poor head control, sluggish reflexes, and reduced muscle tone. Cerebrospinal fluid was clear, an electroencephalogram was normal, and a Tensilon test was negative. Type A botulinal toxin was detected in a 7-gram specimen of feces collected on January 16. *Clostri-*

(continued on page 105)

Table I. Summary–Cases of Specified Notifiable Diseases: United States

[Cumulative totals include revised and delayed reports through previous weeks]

DISEASE	11th WEEK ENDING			CUMULATIVE, FIRST 11 WEEKS		
	March 12, 1978	March 19, 1977†	MEDIAN 1973–1977††	March 12, 1978	March 19, 1977†	MEDIAN 1973–1977††
Aseptic meningitis	29	43	35	408	400	393
Brucellosis	–	3	3	28	37	29
Chickenpox	4,997	8,523	6,317	49,987	64,910	57,784
Diphtheria	2	2	4	22	12	34
Encephalitis: Primary	10	9	13	118	130	167
Encephalitis: Post-infectious	1	3	6	25	23	41
Hepatitis, Viral: Type B	295	332	218	3,087	3,317	2,230
Hepatitis, Viral: Type A	593	636	762	5,704	7,071	7,676
Hepatitis, Viral: Type unspecified	144	169		1,791	1,976	
Malaria	16	8	8	86	69	61
Measles (rubeola)	827	1,738	782	4,928	14,633	7,272
Meningococcal infections, total	54	77	44	378	508	393
Civilian	53	77	43	369	506	382
Military	1	–	1	5	2	4
Mumps	498	835	1,076	4,287	8,399	14,198
Pertussis	30	15	—	480	152	—
Rubella (German measles)	229	1,241	655	2,199	5,387	5,445
Tetanus	–	–	1	7	8	9
Tuberculosis	832	385	644	5,944	5,953	5,996
Tularemia	2	–	–	16	17	17
Typhoid fever	19	10	5	87	69	69
Typhus tick-borne (Rky. Mt. spotted fever)	1	1	–	10	17	11
Venereal Diseases: Gonorrhea: Civilian	17,224	17,985	17,985	191,922	198,598	198,598
Gonorrhea: Military	293	546	477	4,665	5,798	6,311
Syphilis, primary and secondary: Civilian	423	354	472	4,233	4,699	5,315
Syphilis, primary and secondary: Military	3	4	4	63	63	71
Rabies in animals	53	50	70	491	491	491

Table II. Notifiable Diseases of Low Frequency: United States

	CUM.		CUM.
Anthrax	–	Poliomyelitis, total	–
Botulism*	4	Paralytic	–
Congenital rubella syndrome	7	Psittacosis* (cum. 1)	19
Leprosy: Calif. 1	15	Rabies in man	–
Leptospirosis* Mich 1	7	Trichinosis	7
Plague	–	Typhus, murine*	7

†Delayed reports received for calendar year 1977 are used to update last year's weekly and cumulative totals. ††Medians for Gonorrhea and Syphilis are based on data for 1975-1977.

*Delayed reports: Botulism: Mo. – 1 (1977); Leptospirosis: Ind. – 1 (1977); Polio, para., Minn. – 1 (1977); Typhus, murine: NYC – 1 (1977).

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