

A Note on the Effects of a Temporary Exposure of an Individual to Pentachlorophenol¹

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The climate of Hawaii is favorable for termite propagation and, therefore, many households of the State include containers of pentachlorophenol formulations in their collection of insecticides for home use, for local spot control of occasional outbreaks of the pest. In spite of the intensive educational campaign that has been conducted recently to acquaint the public on the potential hazards of pesticides usage, needless accidents still occur. Such an incident is discussed below, and describes the misuse of an organic solvent material containing pentachlorophenol as a brush cleaner.

¹The research upon which this publication is based was performed pursuant to Contract No. PH 86-65-79 with the Pesticides Program, National Communicable Disease Center, Bureau of Disease Prevention and Environmental Control, Public Health Service, U. S. Department of Health, Education, and Welfare.

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The individual (male) cleaned a paint brush with a solution obtained from a container labeled with a partially defaced manufacturer's or distributor's pesticide formulation label. The can had originally contained a pentachlorophenol solution, to be applied with a brush to door and sash millwork, as indicated by the portion of the label still intact on the can. After ten minutes of immersion of his hands in this solution, during the cleaning of the brush, he experienced a painful sensation in his hands and noticed that they had become red. The pain persisted for two hours, even though he had thoroughly washed his hands with soap and water at the onset of the pain. Two days later, a 24-hour urine specimen was submitted for pentachlorophenol analysis, to be analyzed by a method previously described (Bevenue et al., 1966). Subsequent samples, each the first voids in the morning before breakfast, were also analyzed for pentachlorophenol content.

The data in Table I indicate that pentachlorophenol was absorbed through the skin, and that elimination of the compound from the body was gradual; 34 to 38 per cent of the concentration measured in the first urine specimen was still present in the urine sample three days after the first sampling, and about 27 per cent of the original value was present three weeks later. No additional illness symptoms have been noted by the individual.

TABLE I

Pentachlorophenol residue in urine of affected individual

Date sampled	Pentachlorophenol found (ppb) ^a	Per cent of Initial Analysis
1-17-67	236	
1-19-67	80	34
1-20-67	90	38
1-30-67	48	20
2-6-67	64	27
2-17-67	23	10
3-7-67	17	7

^aData not corrected for per cent recoveries.
Recovery values of fortified samples were 89% to 92%.
Detection limits of method 3 ppb.

Analysis of the solution that was used to clean the brush indicated an 0.4 per cent concentration of pentachlorophenol and a trace amount of tetrachlorophenol, suggesting that either a very weak pentachlorophenol solution had been formulated or, and most probable, a paint thinner or brush cleaner solvent had been added to a can that contained a residual amount of pentachlorophenol formulation.

Akisada (1965) reported pentachlorophenol residues in the urine of twenty people (not occupationally exposed) ranging from 10 parts per billion (p.p.b.) to 50 p.p.b. Uede et al. (1962)

reported the illness (irritated throats, red faces, and hand and leg weakness) of four families after drinking and bathing in water obtained from a well containing 12.5 p.p.m. pentachlorophenol. The families' health improved within two to three days after the well was declared "off-limits." Our studies (unpublished) on the local male population have indicated pentachlorophenol residues in the urine of occupationally exposed individuals (271 samplings) ranging from a low of 3 p.p.b. to a high of 35,700 p.p.b., with a mean value of 1,244 p.p.b. The pentachlorophenol residue in the urine of individuals not knowingly occupationally exposed (201 samplings) had a mean value of 23 p.p.b.

It is noted from the data in Table I that about one month was required for the pentachlorophenol concentration in the affected individual's urine to decrease to the average amount observed in random samplings of the local male population not occupationally exposed. It is also noted that this is an example of a definite case of pentachlorophenol absorption through the skin.

References

1. Akisada, T., Japan Analyst (Bunseki Kagaku) 14, 101 (1965).
2. Bevenue, A., J. R. Wilson, E. F. Potter, M. K. Song, H. Beckman, and G. Mallett, Bull. Environmental Contamination and Toxicol. 1, 257 (1966).
3. Uede, K., M. Nagai, and M. Osafune, Osaka Sheriti Eisei Kenkyo-Sho Kenleyu Hokoku 7, 19 (1962).