RISKS FROM PESTICIDE EXPOSURE: THE 2,4-D EXAMPLE

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The high rate of use of 2,4-D in the U.S. (approximately 20 million lbs each year) and occasional reports that this herbicide can be linked to adverse health effects in humans are the basis for continued scrutiny of this chemical by the scientific, regulatory and public sectors. A 1986 report that 2,4-D exposure in Kansas farmers causes a higher risk of one type of cancer, Non Hodgkins Lymphoma (NHL), has resulted in a renewed concern for the safe use of the chemical (Hoar et al., Journal American Medical Assoc. 256:1141, 1986). A team of scientists was called together by the Council for Agricultural Science and Technology (CAST) in June of 1987 to prepare a report for the public on the safety of 2,4-D. A brief summary of the conclusions drawn by the CAST Task Force on 2,4-D is given here.

Swedish epidemiologists reported in the late 1970's that forestry workers exposed to phenoxy herbicides had an increased risk for three forms of cancer, including NHL. Those reports were severely criticized on scientific grounds and their results haven not been confirmed in several other epidemiologic investigations. The more recent "Kansas farmer" study, reported a six-fold increase in risk to NHL when farmers applied phenoxy herbicides (purportedly 2,4-D) without using protective measures for more than 20 days per year. No increased risk for other forms of cancer, as reported by Swedish studies, was observed in the Kansas study. Some scientists have discounted the Kansas study because of demonstrable deficiencies in the reporting of the extent of 2,4-D use and exposure and because of other problems typically associated with epidemiologic investigations of this type. Because of the weak evidence and conflicting reports concerning a link between human cancer and 2,4-D, it cannot be concluded at this time that the chemical is carcinogenic in man.

A number of studies concerning the ability of 2,4-D to cause cancer in laboratory animals indicate that the chemical is not carcinogenic. The most recently completed studies in mice and rats fed large doses (up to 45 mg/kg/day) for a lifetime, showed no carcinogenic activity. Many cancer causing chemicals produce damage to DNA thereby mutations and eventually tumors. The results of many tests for possible damage to DNA by 2,4-D show that this chemical is inactive in this respect.

Persons involved in the manufacture of 2,4-D and applicators of the chemical represent individuals who have the highest exposure. Except for the studies mentioned above, no adverse health effects have been found in these workers when they are compared to other less exposed groups of individuals. The herbicide typically enters the body through the skin and is excreted rapidly from the body via the urine. It does not accumulate to high levels in the human body or in the environment (wildlife, soil, plants and water). Typical applicator exposure rates are below 0.03 mg/kg/day. This rate of exposure is 1/50th of the dose that has been fed to mice and rats for a lifetime without causing any biological effects in the animals. Applicator exposure can be estimated to be less than 1/10 of the amount deemed by the World Health Organization to be safe for lifetime human consumption via food and water.

Using all the available information on the safety of 2,4-D, the CAST Task Force concluded "that 2,4-D as it is generally used, does not represent a significant human health threat. However, users should apply it with care and respect required of every chemical that can cause harmful effects at high doses". Other epidemiologic investigations of a possible cancer risk from 2,4-D exposure in farmers are being conducted in Nebraska, Iowa and Minnesota by scientists from the National Cancer Institute. Should those results confirm those obtained in Kansas, the above conclusion must be reevaluated. Preliminary results from those ongoing studies appear not to confirm the Kansas results, but continued scientific vigilance will be necessary to insure the safety of this widely used chemical.

Recommended reading of recent scientific reviews of 2,4-D safety.

1. Perspectives on the Safety of 2,4-D. CAST (137 Lynn Avenue, Ames, Iowa, 50010) 1987.

2. Expert Panel Report on the Carcinogenicity of 2,4-D. Canadian Centre for Toxicology Review for Ontario Pesticide Advisory Committee. Ontario Ministry of the Environment, 1987. (Call John Steele 416-323-4337).

3. T. L. Lavy, U.S. Veterans Administration Report "Human Exposure to Phenoxy Herbicides", May 1987 (Veterans Administration Central Office, Department of Medicine and Surgery, Agent Orange Projects Office, Wasington, D.C. 20420).

4. "Review of Scientific Literature on Herbicides Including Phenoxy Herbicides and Associated Dioxins, Vol. IX and X, U.S. Veterans Administration, 1987. (See address above).