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RACHEL'S HAZARDOUS WASTE NEWS #353

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News and resources for environmental justice.

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EPA: DIOXIN DOES CAUSE CANCER IN HUMANS

An explosion at a Hoffman-LaRoche chemical plant in Seveso, Italy, in 1976 sent a cloud of the herbicide 2,4,5-T over the surrounding countryside, contaminating several thousand people. Dioxin is created as an unwanted by-product during the manufacture of 2,4,5-T, so the Seveso population was exposed to dioxin. For years, optimists have been pointing to Seveso saying, "Dioxin doesn't cause cancer in humans--look at Seveso." Now a new study in the journal EPIDEMIOLOGY reveals that people exposed to dioxin during the Seveso explosion have begun to exhibit excessive numbers of cancers.[\[1\]](#)

Dr. Linda Birnbaum, director of environmental toxicology for U.S. EPA [Environmental Protection Agency], told the Associated Press that the new study "is one more nail in the coffin" for dioxin.[\[2\]](#) Birnbaum, who is coordinating EPA's multi-year "scientific reassessment" of dioxin said, "This, together with other studies, clearly supports that dioxin has the potential to cause cancer in people, just as it does in every animal it's been tested in. The weight of the evidence is becoming overwhelming," she told AP reporter Paul Raeburn.

The area around Seveso has been divided into three zones, called A, B and R. The small A zone was most heavily contaminated, but its 724 residents were evacuated. ("Heavy" contamination means that each square yard of land contained 13 to 494 micrograms of dioxin; a microgram is a millionth of a gram and there are 28 grams in an ounce.) The B zone was less heavily contaminated but its 4824 residents were not evacuated; zone B contained 43 micrograms of dioxin per square yard of soil, or less. The R zone was even less contaminated (average contamination being 4.3 micrograms per square yard), so its 31,647 residents were probably exposed to low levels. Another 181,579 people living beyond zone R serve as a control group living in "noncontaminated" areas.

The greatest cancer increase has occurred in zone B. In zone A the numbers are small and no significant

cancer increases have occurred. In zone R one kind of cancer has increased: soft tissue sarcoma. Previous studies have linked dioxin exposure to soft tissue sarcoma in humans.

In zone B, among women there has been an observable increase in cancers of the gall bladder and biliary tract (the system that delivers bile from the liver to the small intestine), and in cancers related to the blood-forming system (multiple myeloma and myeloid leukemia).

Among men in zone B, there were observable increases in cancers of the blood-forming system, and in one kind of non-Hodgkin's lymphoma (a cancer of the lymph system called lymphoreticulosarcoma).

This new study only covers the period 1976 through 1986--10 years after the Seveso accident. Since most cancers take longer than 10 years to develop, the cancers reported in this study may represent only the earliest signs of more trouble to come.

This Seveso study is not the first to indicate that dioxin causes cancer in humans. [\[3-10,14,15\]](#) Swedish researchers in the late 1970s began reporting that exposure to phenoxy herbicides (2,4-D and 2,4,5-T) caused a 3-fold to 6-fold increase in the risk of soft tissue sarcomas and lymphomas. Phenoxy herbicides are contaminated with dioxin during manufacture.

Monsanto Corporation, a major manufacturer of phenoxy herbicides, in the late 1970s and early 1980s sponsored studies of workers that the company had exposed to dioxin, and these studies showed no increased cancer deaths among exposed workers. However, the Monsanto studies have been criticized by a report from the National Research Council, [\[11\]](#) which says Monsanto's studies were "plagued with errors in classification of exposed and unexposed groups, according to some reports, and hence have been biased toward a finding of no effect." A 1990 analysis of Monsanto workers, conducted by the National Institute for Occupational Safety and Health, reported a statistically-significant increase in soft tissue sarcomas. [\[12\]](#)

As part of its multi-year scientific reassessment of dioxin, EPA recently published a draft review of all scientific data linking dioxin to cancer and other health effects in humans. [\[13\]](#) The EPA's draft document concludes that four separate studies[\[8,9,14,15\]](#) of workers exposed to dioxin have revealed an "overall increased mortality from all malignancies combined." EPA speculates that dioxin's ability to mimic hormones gives dioxin the capacity to cause cancer in many different organs and bodily systems in humans. [\[13, pg. 7-7\]](#)

There seems to be little room left for doubt: As the EPA's "scientific reassessment team" told then-chief of EPA, William Reilly, January 27, 1992: "Dioxin does cause cancer in humans." (See [RHWN #283.](#))

It therefore seems that EPA now has little choice but to declare dioxin a class A carcinogen, i.e., one known to cause cancer in humans. This would have far-reaching implications for public health policy. (A public hearing to discuss the new EPA document, and its implications, is scheduled for 9-to-5

September 7 and 8, 1993, at the Ritz-Carlton Hotel in Pentagon City, Arlington, Va. If you want to reserve time to speak, contact Helen Murray of Eastern Research Group: (617) 674-7374. The meeting will be full and space is limited, so we suggest you arrive by 8 a.m. if you want a seat.)

An editorial in the September issue of EPIDEMIOLOGY points out some of the public policy implications of the conclusion that dioxin causes cancer in humans. [16] The author of the editorial, Swedish dioxin researcher Olav Axelson, says that the "biological effects of TCDD [dioxin]" are "a first order public health concern." Axelson says "there seems to be an urgent and costly need to change or improve industrial and other processes so as not to produce dioxins (and the toxicologically similar chlorinated dibenzo-furans). For example, there is a need to restrict the use of chlorine in paper bleaching. Incineration of waste material at too low temperature should be avoided as well as the 'combustion' of organochlorine compounds in general," Axelson says.

Dioxin is produced by every municipal solid waste incinerator ever tested; it is produced by all hazardous waste incinerators, cement kilns and BIFs [boilers and industrial furnaces] that burn chlorinated wastes. It is produced by the manufacture of many pesticides (85% of which involve chlorine). It is produced by metal smelters, and paper mills, and probably by other common industrial processes. Although there is now little doubt that dioxin causes cancer in humans, translating that into public policies that genuinely protect public health will create a political firestorm. Once again, EPA chief Carol Browner faces a series of decisions that will define clearly and unmistakably which side she and Bill Clinton are on.

--Peter Montague, Ph.D.

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[1] Pier Alberto Bertazzi and others, "Cancer Incidence in a Population Accidentally Exposed to 2,3,7,8-Tetrachlorodibenzo-PARA-dioxin," EPIDEMIOLOGY Vol. 4 (September, 1993), pgs. 398-406.

[2] Paul Raeburn, "Dioxin Dangers," a story on the Associated Press news wire datelined New York, August 29, 1993.

[3] Lennart Hardell and others, "Case-control study: soft-tissue sarcomas and exposure to phenoxyacetic acids or chlorophenols," BRITISH JOURNAL OF CANCER Vol. 39 (1979), pgs. 711-717.

[4] Lennart Hardell and others, "Malignant lymphomas and exposure to chemicals, especially organic solvents, chlorophenols, and phenoxy acids: a case-control study," BRITISH JOURNAL OF CANCER Vol. 43 (1981), pgs. 169-176.

[5] Mikael Eriksson and others, "Soft tissue sarcomas and exposure to chemical substances: a case-referent study," BRITISH JOURNAL OF INDUSTRIAL MEDICINE Vol. 38 (1981), pgs. 27-33.

[6] Sheila Hoar and others, "Agricultural herbicide use and risk of lymphoma and soft-tissue sarcoma," JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION Vol. 256 (1986), pgs. 1141-1147.

- [7] Sheila Hoar Zahm and others, "A case-control study of non-Hodgkin's lymphoma and the herbicide 2,4-dichloro phenoxyacetic acid (2,4-D) in Eastern Nebraska," EPIDEMIOLOGY Vol. 1 (1990), pgs. 349-356.
- [8] Marilyn Fingerhut and others, "Cancer Mortality in Workers Exposed to 2,3,7,8-tetrachloro-dibenzo-P-dioxin," NEW ENGLAND JOURNAL OF MEDICINE Vol. 324 (1991), pgs. 212-218.
- [9] R. Saracci and others, "Cancer Mortality in Workers Exposed to Chlorophenoxy Herbicides and Chlorophenols," LANCET Vol. 338 (1991), pgs. 1027-1032.
- [10] Pier Alberto Bertazzi and others, "Ten-year Mortality Study of the Population Involved in the Seveso Incident in 1976," AMERICAN JOURNAL OF EPIDEMIOLOGY Vol. 129 (1989), pgs. 1187-1200.
- [11] Anthony B. Miller and others, ENVIRONMENTAL EPIDEMIOLOGY VOLUME 1 PUBLIC HEALTH AND HAZARDOUS WASTES (Washington, D.C.: National Academy Press, 1991), pg. 207.
- [12] Marilyn A. Fingerhut and others, MORTALITY AMONG U.S. WORKERS EMPLOYED IN THE PRODUCTION OF CHEMICALS CONTAMINATED WITH 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) FINAL REPORT [PB91-125971] (Springfield, Va.: National Technical Information Service, 1991).
- [13] David Bayliss, Marie Sweeney and others, CHAPTER 7. EPIDEMIOLOGY/HUMAN DATA [EPA/600/AP-92/001g; Revised June 1993; Workshop Review Draft] (Cincinnati, Ohio: U.S. Environmental Protection Agency, Center for Environmental Research Information, 1993). For a free copy while supplies last, phone EPA in Cincinnati: (513) 569-7562.
- [14] A. Manz and others, "Cancer mortality among workers in chemical plant contaminated with dioxin," LANCET Vol. 338 (1991), pgs. 959-964.
- [15] A. Zober and others, "Thirty-four-year mortality follow-up of BASF employees exposed to 2,3,7,8-TCDD after the 1953 accident," INTERNATIONAL ARCHIVES OF OCCUPATIONAL AND ENVIRONMENTAL HEALTH Vol. 62 (1990), pgs. 139-157.
- [16] Olav Axelson, "Seveso: Disentangling the Dioxin Enigma?" EPIDEMIOLOGY Vol. 4 (September, 1993), pgs. 389-391.

Descriptor terms: explosions; accidents; spills; hoffman-laroche; seveso; italy; 2,4,5-t; herbicides; pesticides; studies; linda birnbaum; epa; dioxin; carcinogens; cancer; soil contamination; soft tissue sarcoma; sts; gall bladder cancer; biliary tract cancer; liver cancer; multiple myeloma; myeloid leukemia; hematopoietic system cancers; blood; lymphomas; non-hodgkin's lymphomas; phenoxy

herbicides; 2,4-d; monsanto; william gaffey; w r gaffey; judith zack; j a zack; occupational safety and health; nrc; national research council; niosh; marilyn fingerhut; chlorine; chlorinated solvents; incineration; cement kilns; bifs; boilers; industrial furnaces; carol browner; bill clinton;

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