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## **SILVEX -- NEW STUDY LINKS DIOXIN TO HUMAN CANCER.**

A new study published last month provides fresh evidence that dioxin [TCDD] causes cancer in humans. Dioxin is not a commercial product but is created as an unwanted byproduct of many industrial processes; significant quantities of dioxin are released from the smoke stacks (and the ash landfills) of incinerators that burn chlorine-containing items--such as medical wastes, sewage sludge, and municipal solid wastes. Once it is released into the environment dioxin persists for a very long time, enters food chains, and accumulates; when humans eat dioxin contaminated food, such as milk or fish, the humans themselves accumulate dioxin in their blood and fatty tissues.

[1]

Scientists have known since the mid-1960s that dioxin is an extremely powerful promoter of cancer in laboratory animals, but industry researchers have recently been claiming that humans somehow are exempt from the dioxin danger. The question of dioxin's hazard to humans took on real urgency in the early '80s when 15,000 veterans sued Dow chemical and other producers of Agent Orange (a dioxin-contaminated herbicide widely used to defoliate the jungle in Vietnam from 1962 to 1971); the vets sought money damages for health effects (cancer, defective offspring, and so forth) they said they were experiencing. Lawyers for the Vietnam vets offered documentary evidence that Dow chemists convened a private meeting of their competitors in 1965 to share new information that impurities [dioxins] in the herbicide 2,4,5-T (principal component of Agent Orange) caused severe liver damage in rabbits. According to court records, a chemist at Hercules Powder Company who attended the private Dow meeting in 1965, received a phone call from a Dow executive who "warned him to keep the findings away from the federal government," according to a reporter for Nature, the British science journal. [2] If this is true, it would not be the first time, nor the last, that money has influenced the outcomes, and the uses, of scientific studies.

In any case, as a result of these lawsuits, during the 1980s the question of dioxin's effects on humans became subject of bitter controversy--with enormous sums of money riding on the outcome of the debate. As the 1980s drew to a close and it became known that all incinerators create and release dioxin into the local environment, industry felt enormous pressure to "prove" that dioxin was harmless to humans. From 1980 onward, industry researchers published several studies of dioxin-exposed workers, claiming to show that they suffered no more cancer than the general public. Last year, however, evidence began to accumulate indicating that the industry-funded studies of dioxin dangers to humans were badly flawed or were simply fraudulent.

The latest study is not by industry researchers but by Dr. Marilyn Fingerhut of the federal National Institute for Occupational Safety and Health (NIOSH); Fingerhut looked at the health of 5172 workers at 12 chemical plants that manufacture (or formerly manufactured) products contaminated with dioxin such as the herbicides 2,4,5-T, Silvex, Ronnel, Erbon, and pentachlorophenol (which has also been used as a fungicide, algicide, and wood preservative for telephone poles and pilings), and the bacterial cleansing agent, hexachlorophene--until the 1970s, a leading bactericide in hospitals.

Of the 5172 exposed workers (all of whom were male), 1520 met two key conditions: they had been exposed for at least a year, and their exposure had begun at least 20 years previously. The onset of cancer is always delayed by 7 to 40 years (or more) between the time of initial exposure and the time disease appears; therefore, the "latency" period of at least 20 years is important in studying cancer that may be related to a particular chemical exposure. This group ("cohort," to use the language of medical researchers) had nine times (900%) the normal amount of soft tissue

sarcoma--malignant cancer of the soft connective tissues. The same group also had 42% more cancers of the respiratory tract (trachea, bronchus and lung) than would be expected among males in the general public; by various means, Dr. Fingerhut examined and tried to eliminate the possibility that tobacco smoking explained the increase in respiratory cancers.

Among the entire cohort of 5172 men, the occurrence of all cancers was significantly increased, by 15%; in the high-exposure group of 1520 men, the "all cancers combined" increase was even more pronounced--46%; furthermore "all cancers combined" were increased among workers at nine of the 12 plants studied. Even when cancers of the respiratory tract were omitted in an attempt to eliminate smoking as a possible cause, "all cancers combined" was increased among the 5172 and even more so among the high-exposure 1520.

Dr. Fingerhut says correctly that her results do not prove that dioxin causes cancer in exposed workers. The workers she studied were exposed to many other chemicals, in addition to dioxin, on the job, and these other chemicals could explain the cancer increases she observed.

Nevertheless, the Fingerhut study makes it ever more difficult for the purveyors of dioxin-creating machines (such as incinerators for solid waste, hazardous waste, or sewage sludge) to claim that their dioxin emissions are negligible or harmless. Because dioxin accumulates in the food chain, even small amounts can build up to significant levels as time passes.

An editorial in the NEW ENGLAND JOURNAL OF MEDICINE tried to shed light on the meaning of the Fingerhut study the day it appeared. [3] The well-known Canadian biostatistician, John Bailar, wrote, "This evidence is short of proof, as the authors explain, but it must be taken seriously as a flag of a probable human risk. If one accepts the best estimate of excess risk given here (3 deaths observed among the 1520 workers minus 0.3 expected deaths equals 2.7), the lifetime risk of death from TCDD-related soft-tissue sarcoma is already approaching 2 per 1000 workers, and it may increase with additional follow-up study. This estimate falls in a range that is widely considered unacceptable for occupational hazards, and it is far in excess of the usual limits for lifetime risk to the public of 1 per 100,000 or 1 per million. "Despite the problems, which Fingerhut et al. carefully note, this work is a model of its kind. Occupational cohort studies are inherently difficult and uncertain, and we are likely to wait a long time for appreciably better or broader evidence of the effects of TCDD [dioxin] on human health....

"The hypothesis that low exposures [to dioxin] are entirely safe is distinctly less tenable now than before," Dr. Bailar said.

--Peter Montague, Ph.D.

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[1] Bengt-g"ran Svensson and others, "exposure to Dioxins and Dibenzofurans Through the Consumption of Fish." NEW ENGLAND JOURNAL OF MEDICINE Vol. 324 (Jan. 3, 1991), pgs 8-12.."

[2] Peter David, "Dioxin--When was the Danger Known?" NATURE Vol. 303 (May 12, 1983), pg. 104.

[3] John C. Bailar III, "How Dangerous is Dioxin?" NEW ENGLAND JOURNAL OF MEDICINE Vol. 324 (Jan. 24, 1991), pgs. 260-262.

Also read: Marilyn A. Fingerhut and others, "Cancer Mortality in Workers Exposed to 2,3,7,8-Tetrachlorodibenzo-p-dioxin," NEW ENGLAND JOURNAL OF MEDICINE Vol. 324 (Jan. 24,

1991), pgs. 212-218. Reprints free from Dr. Fingerhut at: Industrywide Studies Branch, Division of Surveillance, National Institute for Occupational Safety and Health, Centers for Disease Control, 4676 Columbia Parkway, Cincinnati, OH 45226.

A more complete report of this research is available under the title **MORTALITY AMONG U.S. WORKERS EMPLOYED IN THE PRODUCTION OF CHEMICALS CONTAMINATED WITH 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD)**. Springfield, VA: National Technical Information Service (NTIS), Dec., 1990. Available from NTIS, 5285 Port Royal Rd., Springfield, VA 22161; phone (703) 4874650; NTIS number PB91-125971. \$15.00 + shipping.