

Rachel's Environment & Health News

#559 - Childhood Cancer and Pollution

August 13, 1997

A new peer-reviewed study in England shows that children have an increased danger of getting cancer if they live within three to five kilometers (2 to 3 miles) of certain kinds of industrial facilities.[1] The study, by E.G. Knox and E.A. Gilman, finds that the danger is greatest within a few hundred yards of pollution sources and tapers off with distance. The incidence of childhood cancers per 100,000 children in England and the U.S. has been rising steadily for at least 20 years.

The new study examined data for 22,458 children who died of leukemia (cancer of the blood-forming cells) or of other cancers during the years 1953 to 1980 in England. The study looked at home address at time of birth and home address at time of death, then measured the physical distance from these addresses to nearby industrial facilities.

Excesses of leukemias and other cancers among children were found near the following kinds of industries:

** oil refineries, major oil storage installations, railside oil distribution terminals, and factories making bitumen (a British term for asphalt, crude petroleum and tar).

** automobile factories, auto body construction factories, and auto body repair shops;

** major users of petroleum products including paint sprayers, fiber glass fabricators, paint and varnish makers, manufacturers of solvents, plastics and detergents, and galvanizers (zinc metal platers).

** users of kilns and furnaces, including steel mills, power plants, cement manufacturers, brick makers, crematoria, and foundries for iron and steel, aluminum, and zinc.

** airfields, railways, highways, and harbors.

This study was also interesting for what it did NOT find:

** Rubber manufacturers showed slight increases in childhood cancers nearby, but tire manufacturing plants did not. Likewise, brake manufacturing showed no excessive childhood cancers nearby.

** Despite the use of solvent-based cleaning, electroplating plants showed no childhood cancer increases nearby.

** Twenty-two factories making halogenated hydrocarbons (chlorinated and fluorinated) had no apparent effect but 32 other solvent manufacturers showed cancer effects up to 5 kilometers (3 miles) away.

** Metal casting (aluminum and zinc), metal forming, and welding probably account for the effects seen near automobile manufacturing plants, the authors say. However, casting and refining of lead showed no childhood cancer effects. The manufacture of automobile batteries, on the other hand, exhibited strong effects. The authors speculate that it may be the manufacture of battery casings (plastics forming, and use of solvents) that create the childhood cancer effect, rather than the lead itself.

** Other industries that did not seem to be associated with childhood cancers included agricultural fertilizer rail terminals; TV transmitters; cake and biscuit bakers; dry cell battery manufacturers; magnetic tape makers; nuclear power plants; PVC manufacturers; and the makers of wood preservatives.

** Benzene manufacturing plants were not associated with nearby clusters of childhood cancers. The known leukemia hazard from benzene may have led to special containment measures.

The findings for leukemias and for other cancers were the same.

Among children who had changed addresses between birth and death, the cancer hazard could only be seen near the birth address, implying that exposure to pollutants shortly before or after birth caused the cancers.

Knox and Gilman, the authors of this study, have spent several years developing analytic techniques for identifying small-scale cancer clusters, usually cancers occurring within 150 to 300 meters (roughly 150 to 300 yards) of each other.[2] The authors say they are sure their techniques can now identify cancer clusters at the neighborhood level. "First, our recent analyses have effectively dispelled caveats about the reality of short range case clustering and the existence of geographically localised hazards is not now in doubt. Proximity studies are no longer concerned with this issue and can be directed solely at asking what those hazards might be," they say.[1]

This latest study takes these techniques the next step and links the cancer clusters to nearby sources of pollution, particularly those involving large quantities of petroleum.

The weakness of this latest study, the authors say, is that it cannot rule out the possibility that there are excessively large numbers of children living near industrialized facilities, which could create the false impression of high cancer rates. The authors examine this question as best they can, and they show that, in general, there are few residences within short distances (a few hundred yards) of major factories because associated facilities (roads, parking lots, garages, etc.) compete for space with residential buildings.

The authors conclude that childhood cancers cluster around two general kinds of facilities:

** producers, refiners, distributors, and industrial users of petroleum fuels and volatile petroleum products; and

** manufacturing processes using high temperature furnaces, kilns, and combustion chambers.

Some operations, notably internal combustion engines and oil fired furnaces, meet both criteria.

The authors of the study say there may be three mechanisms by which childhood cancers are caused:

** Gases and volatile organic compounds reaching children or their pregnant mothers directly;

** Parents' germ cells being harmed during occupational exposures, giving rise to children who are predisposed to cancers;

** Occupational contamination carried home on clothing, skin, or breath.

Of the three mechanisms, the authors say they believe direct exposure of children or their pregnant mothers is the most likely.

The authors say their study may have missed many local sources of petroleum exposure of children, such as domestic and commercial heating systems, oil storage bunkers, oil delivery spills, small machine shops, bus stations, school or hospital chimneys, municipal incinerators, gasoline stations, etc.

Childhood cancers could be caused by at least 3 mechanisms:

** Pollutants damaging the inherited genetic material (DNA) in cells;

** Pollutants damaging the immune system which would otherwise prevent cancer cells from surviving;

** Pollutants damaging mechanisms of cell division. (Cancer is

uncontrolled cell division.)

These latest findings, that childhood cancers are clustered near industrial facilities, contradict the official view of childhood cancer, at least in the U.S. The National Cancer Institute (NCI) wrote in 1993, "Time trends in childhood cancer are not likely to be affected by environmental agents because very few are known that cause cancer within the pediatric age-span, and exposures have been rare or limited." And: "Clusters of childhood cancer occur very often by chance and almost never because of environmental agents." [3] Nevertheless, the NCI does say that children exposed to radiation (as at Hiroshima and Nagasaki) can develop cancers. Exposure to benzene could cause childhood leukemia, says NCI, because benzene affects chromosomes the same way radiation does. The children of mothers treated with diethylstilbestrol (DES) --a drug given to women in the 1950s to prevent miscarriage --can develop childhood cancers, NCI acknowledges.

NCI reports that the incidence (per 100,000 children) of many childhood cancers have increased steadily during the period 1973-1990. All childhood cancers combined have increased at the rate of 0.9% per year (0.9% per year among whites, and 1.0% per year among African-Americans). Cancer of the brain and central nervous system have increased at 1.8% per year. Leukemias have increased at 1.8% per year. Non-Hodgkin's lymphomas have increased at 1.4% per year. Kidney cancer has increased at 1% per year. However, thanks to surgery, radiation treatments, and chemotherapy, death rates for all these childhood cancers have declined steadily since 1973 at an average rate of 2.9% per year even as the incidence rates have increased. [3]

U.S. environmental officials discourage the kind of study reported here. Each year U.S. Environmental Protection Agency (EPA) collects data on toxic releases as self-reported by industrial polluters, thus creating the annual Toxics Release Inventory, or TRI database, which is authorized by federal law. However, EPA has never assigned any staff to check the quality of the self-reported data, thus making any studies based on the TRI data suspect. Furthermore, when John R. Stockwell, a physician employed by the U.S. Environmental Protection Agency (EPA), developed a technique for linking data from the TRI database with disease rates near pollution sources in Chattanooga, Tennessee, EPA officials immediately tried to fire Stockwell. (See REHW #366, #392.) Because of citizen protests, Stockwell managed to keep his job, but he has not undertaken any similar studies since then, and neither has anyone else within EPA. EPA chief Carol Browner has issued a memo specifically ordering EPA staff to "stay away from linking human health effects and the TRI data." (REHW #392)

Another EPA official who tried to link industrial toxic releases to human health has also found himself in serious trouble. Brian Holtzclaw, an environmental engineer employed by EPA but "on loan" to the state of Kentucky, urged the study of massive toxic releases from an Ashland Oil refinery to see if they correlated with disease rates in neighboring communities. He tried to bring in John Stockwell to study Ashland's toxic discharges, and he himself released some pollution data to local citizens. Holtzclaw was immediately terminated from his Kentucky projects and reassigned to Atlanta, Georgia. Holtzclaw fought the reassignment. Hundreds of environmental groups and individuals all across the country have signed letters and petitions on Holtzclaw's behalf. After a legal battle, EPA --without admitting any wrongdoing -- settled with Holtzclaw for \$20,000 and a written promise that he could continue to work on environmental justice issues. However, Holtzclaw's court battle against the U.S. Department of Labor and the state of Kentucky continues. He wants his job back in Kentucky and he wants his court costs reimbursed. [4]

The Stockwell and Holtzclaw cases send an unmistakable message from EPA chief Carol Browner to all EPA employees: Beware. The

relationship of pollution to human disease is a forbidden topic of study.

--Peter Montague (National Writers Union, UAW Local 1981/AFL-CIO)

=====

[1] E.G. Knox and E.A. Gilman, "Hazard proximities of childhood cancers in Great Britain from 1953-80," JOURNAL OF EPIDEMIOLOGY AND COMMUNITY HEALTH Vol. 51 (1997), pgs. 151-159.

[2] See E.G. Knox, "Spatial clustering of childhood cancers in Great Britain," JOURNAL OF EPIDEMIOLOGY AND COMMUNITY HEALTH Vol. 50, No. 3 (June 1996), pgs. 313-319. And: E.G. Knox, "Leukaemia clusters in childhood: geographical analysis in Britain," JOURNAL OF EPIDEMIOLOGY AND COMMUNITY HEALTH Vol. 48, No. 4 (August 1994), pgs. 369-376. And: E.G. Knox, "Leukaemia clusters in Great Britain. 1. Space-Time interactions," JOURNAL OF EPIDEMIOLOGY AND COMMUNITY HEALTH Vol. 46, No. 6 (December 1992), pgs. 566-572. And: E.G. Knox, "Leukaemia clusters in Great Britain. 2. Geographical concentrations," JOURNAL OF EPIDEMIOLOGY AND COMMUNITY HEALTH Vol. 46, No. 6 (December 1992), pgs. 573-576. And: E.A. Gilman, "Childhood Cancers: space-time distribution in Britain," JOURNAL OF EPIDEMIOLOGY AND COMMUNITY HEALTH Vol. 49, No. 2 (April 1995), pgs. 158-163.

[3] Barry A. Miller, and others, editors, SEER CANCER STATISTICS REVIEW 1973-1990 [NIH Publication No. 93-2789] (Bethesda, Maryland, 1993), pgs. XXVII.1 to XXVII.15.

[4] Scott Learn, "Project director says EPA won't let doctor participate," LEXINGTON [KENTUCKY] HERALD-LEADER March 20, 1994, pg. A15. And see: Andrew Melnykovich, "EPA to Pay \$20,000 settlement to employee," THE [LOUISVILLE, KENTUCKY] COURIER JOURNAL November 3, 1995, pg. 1. And see: Southern Organizing Committee for Economic and Social Justice (SOC), "Hundreds of Citizen Groups Call on Department of Labor to Uphold Rights of Environmental Whistleblower," press release dated October 11, 1996; for further information, contact SOC at (502) 776-7874, or (404) 755-2855, or Mr. Holtzclaw himself at (404) 562-8868.

Descriptor terms: oil industry; petroleum; cancer; childhood cancers; leukemia; brain cancer; kidney cancer; studies; england; e.g. knox; cancer clusters; automobile manufacture; automobile repair; paint; fiber glass; solvents; plastics; detergents; metal plating and finishing; boilers and industrial furnaces; bifs; crematoria; iron; steel; zinc; aluminum; cement kilns; airports; railroads harbors; rubber manufacturers; metal casting; welding; automobile batteries; emf; benzene; pvc; high-temperature combustion; diesel exhaust; internal combustion engines;