

Rachel's Environment & Health News

#120 - Niosh Issues Cancer Alert For Diesel Exhaust Fumes

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One reason why people often oppose a new facility is increased truck traffic. Trucks are big and noisy and subject to accidents, and when accidents occur involving trucks, there's a high likelihood of fatalities.

However, the federal government has recently concluded officially that there is another good reason to be concerned about increased truck traffic in your neighborhood: five separate studies in the last 3 years have shown that diesel exhaust certainly causes cancer in laboratory animals, and two studies of railroad workers show that it causes cancer in humans as well. As a result of this determination, the National Institute for Occupational Safety and Health (NIOSH) has issued a special publication, **CARCINOGENIC EFFECTS OF EXPOSURE TO DIESEL EXHAUST**, offering this recommendation: "As prudent public health policy, employers should assess the conditions under which workers may be exposed to diesel exhaust and reduce exposures to the lowest feasible limits." Citizens may reasonably ask: if NIOSH believes workers should not be exposed to diesel exhaust because of the cancer hazard, can health officials in other parts of government believe that the general public should continue to be exposed to diesel exhaust? Taken in this light, risk assessments that discuss only the traffic hazards associated with a facility are missing the major point: diesel trucks can evidently kill innocent people even if no traffic accidents occur.

Diesel engines are more efficient than gasoline engines; they produce more horsepower per gallon of fuel, and they use a less-refined (thus cheaper and more plentiful) fuel. When diesel fuel burns in an engine's combustion chamber, the resulting exhaust contains gases and particles (soot). The gases include nitric oxide, nitrogen dioxide, oxides of sulfur, and hydrocarbons (e.g., ethylene, formaldehyde, methane, benzene, phenol, 1,3 butadiene, acrolein, and polynuclear aromatic hydrocarbons [PAHs], several of which are known carcinogens). Of the particles in diesel exhaust, 95% are less than 1 micron in diameter and thus they are respirable, which is to say they are easily taken into the deepest portions of the human lung where they may lodge forever. The core of each particle is made up of pure carbon, but as many as 18,000 different chemicals from the gaseous portion of the exhaust may be adsorbed (attached) onto the carbon core, and thus diesel exhaust can carry a whole host of exotic, toxic and carcinogenic chemicals into the deepest portions of your lung-down in the region where the transfer of gas occurs to put oxygen into your blood stream and to take carbon dioxide out.

As recently as 1986, NIOSH concluded that diesel exhaust did not cause cancer in laboratory animals. However, in the period 1986-1988, five long-term animal studies, and two epidemiologic studies of humans, all concluded that exposure to diesel exhaust causes lung cancer. As a result, NIOSH reversed itself and in August, 1988, issued a special "current intelligence bulletin" to get the word out that diesel fumes are dangerous. NIOSH estimates that 1.35 million American workers are routinely exposed to diesel exhausts.

Get: **CARCINOGENIC EFFECTS OF EXPOSURE TO DIESEL EXHAUST [CURRENT INTELLIGENCE BULLETIN 50; DHHS (NIOSH) PUBLICATION NO. 88-116]**. Cincinnati, OH: Division of Standards Development and Technology Transfer, NIOSH, Robert A. Taft Laboratories [4676 Columbia Parkway, Cincinnati, OH 45226], August, 1988; phone (513) 5338287. It's 30 pages and free.

--Peter Montague

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DANGERS OF DIOXIN EXPOSURES: ABSORPTION THROUGH THE SKIN

Traditionally, people concerned about the toxicity of chemicals have

mainly worried about the mouth and lungs as a means of entry into the human body. Now new evidence suggests that absorption through the skin may be an important way for some chemicals to enter the body. In addition, the skin of babies may allow more toxics to pass through it than the skin of older humans.

Researchers at the National Institute of Environmental Health Sciences studied the absorption of dioxins and furans in mice and rats. They discovered several new aspects of chemical absorption by the skin: (1) the skin presents a more effective barrier against some chemicals than against others; (2) mice absorb a greater percent of dioxin when lower doses are administered than when higher doses are administered; (3) young adult rats absorbed a greater percentage of the administered dose than did middle-aged rats.

In the past, the theory has been that the skin (which has a total area of 1.8 square meters in the adult human) has served as a passive barrier to chemicals. Now it is apparent that the skin is very active in metabolizing (biologically altering) chemicals and that these metabolic processes affect the way the body absorbs (or does not absorb) a particular chemical. Sweat glands, sebaceous glands (which produce oils), and hair follicles can all contribute to the way chemicals are absorbed through the skin.

Chemicals administered at low doses are more effectively absorbed through the skin than are chemicals administered at high doses. Mice receiving 0.3 micrograms of dioxin per kilogram of body weight absorbed 40% of the dose; mice receiving 32 to 320 micrograms of dioxin per kilogram of body weight absorbed less than 20% of the dose. This may be important for human exposures, which usually occur at low doses over long periods rather than in high doses over short periods.

Three month old rats (young adults) absorbed 16% of dioxin applied to their skin; nine-month-old rats (middle-aged) absorbed less than 5% of a similar dose.

Linda Birnbaum, who directed the research, says that her work shows that acute toxicity from skin exposure to dioxins and furans is "unlikely." Chronic (longterm) toxicity is a different matter: That's where "you're going to have the potential to build up a body burden" of the toxic chemicals, she says. Her work with young rats also concerns her because there is evidence that the skin of human babies is much more permeable than skin of adults.

The importance of this work for grass roots activists seems to be this: if someone is going to expose your community to small amounts of dioxins and furans for a long time, ask them to please consider absorption through the skin, and especially so in the case of babies and children. Any risk assessments that have been done without considering skin absorption should be redone in light of the new findings.

Get: David Brewster and others, "Comparative Dermal Absorption of 2,3,7,8 Tetrachlorodibenzo-p-dioxin and Three Polychlorinated Dibenzofurans." **TOXICOLOGY AND APPLIED PHARMACOLOGY**, Vol. 97 (January, 1989), pgs. 156-166. Reprints are free from: Linda S. Birnbaum, Systemic Toxicology Branch, National Institute of Environmental Health Sciences, Research Triangle, North Carolina 27709; phone (919) 541-3212. Ask Ms. Birnbaum for a copy of her unpublished paper on absorption of dioxins by young rats, which she presented at a meeting of the Society of Toxicology in Atlanta, GA, the week of Feb. 27, 1989.

--Peter Montague

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