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RACHEL'S HAZARDOUS WASTE NEWS #120

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News and resources for environmental justice.

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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, Ph.D.

Descriptor terms: niosh; cancers; traffic; diesel; trucks; emissions; lungs; health effects; dioxin; skin; infants; age; studies;

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