

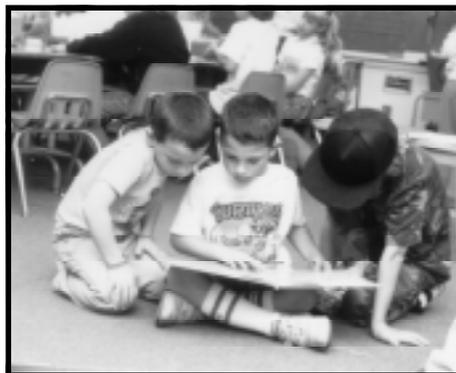
The Risks that Pesticides Pose to Children

- by Becky Riley (October 2000)

There is growing concern among scientists and government agencies about the exposure of children to pesticides. Studies have shown that air, dust, and dermal exposure are significant contributors to total exposure for some pesticides (US EPA, 1990), and that children may face the greatest exposures because of their size, behaviors and lifestyle. In addition, there is a growing base of scientific knowledge linking pesticide exposure to elevated risks of certain childhood cancers or permanent harm to the developing brain or nervous system. This evidence provides ample reason for parents and public officials everywhere to work to eliminate the use of these toxic chemicals in homes, schools, day care centers and parks where children may be exposed.

Greater Exposure

- Children are at risk of **dermal exposure** to pesticides, both indoors and out, because their behavior and lifestyles put them in frequent contact with many surfaces that may be contaminated with pesticide residues (Lewis, 1994; Fenske, 1990; Zartarian, 1998).
- Young children are at particular risk from **ingestion exposure** because they exhibit frequent hand-to-mouth behavior, ingesting relatively large amounts of dust or soil (and any contaminants) in the process (Lewis, 1994; Hawley, 1985).
- Young children are also at greater risk of **inhalation exposure**, because they sit, crawl or roll on the ground nearest to the application sites of many pesticides, or sites where pesticide vapors may settle (Zweiner and Ginsburg, 1988; Fenske, 1990).
- Children receive **relatively greater doses** than adults when exposed to pesticides in the environment, due to the fact that they **breathe in a greater volume of air** and have a **greater skin surface area relative to their smaller body weights** (National Research Council, 1993).



Greater Susceptibility

- Children are especially vulnerable to the toxic effects of many chemicals because **their bodies are smaller and still developing** (National Research Council, 1993).
- Children's **livers and kidneys are unable to detoxify or filter and excrete certain chemicals as quickly as adults**. This contributes to the greater toxicity of some substances to infants and young children (National Research Council, 1993).
- Children's **immune systems are not fully developed** until adolescence. This means they may be more susceptible to harm from exposure to foreign compounds such as pesticides (National Research Council, 1993; Repetto, 1996).



Childhood Cancer

- In 1997, cancer was the **third leading cause of death** in children aged 1 - 19, and the leading cause of death due to disease (American Cancer Society, 2000). An estimated **12,400 new cases** of childhood cancer are expected to be diagnosed in 2000, and 2,300 children are **expected to die** from cancer in 2000 (American Cancer Society, 2000).
- Overall, childhood cancer rates **were up 11% in 1995 over rates in 1973** (National Cancer Institute, 1998). According to recent government statistics, an American child now faces a **one in 663 chance of developing cancer** during the first ten years of life (National Cancer Institute, 1998).
- Although genetic factors can affect susceptibility to cancer, many scientists believe that **environmental exposures** (e.g., smoking, diet, chemicals) are the cause of the majority of cancer cases (Davis, 2000; Doll and Peto, 1981; Schneiderman, 1978).
- As of 2000, the US EPA had classified at least 148 pesticide chemicals as **known, likely, probable, or possible human carcinogens** because they cause cancer in animal tests (Burnam, 2000). See Box 1 for a list of some cancer-causing pesticides that are commonly used at schools or on landscapes or in buildings where children may be exposed.
- **Pesticides** have been linked to elevated rates of various cancers in numerous animal and human epidemiological studies (Hoar, 1986; Wigle, 1990; Zahm, 1990; Cantor, 1992; Kettles, 1997; and many others).
- Children are growing and their **cells are dividing more quickly** than those of adults, making them vulnerable to the effects of cancer-causing chemicals (National Research Council, 1993).
- A number of epidemiological studies over the past decade have found links between **home and garden pesticide use** and elevated rates of several common **childhood cancers**, including **acute lymphocytic leukemia, brain cancer**, and others (Lowengart, 1987; Buckley, 1989; Davis, 1993; Buckley, 1994; Leiss and Savitz, 1995; Meinert, 1996; Pogoda and Preston-Martin, 1997; Zahm and Ward, 1998). In some of these studies, the strongest associations with childhood cancers were found when pesticides were used in the household during pregnancy or nursing (Lowengart, 1987; Pogoda and Preston-Martin, 1997).

Box 1. Pesticides commonly used in school or home settings whose ingredients have been classified by the US EPA as carcinogens
Known, Likely or Probable Human Carcinogens

Active ingredient	Proprietary (Product) Names
propoxur	Baygon
captan	Orthocide
chlorothalonil	Daconil, Bravo
diuron	Karmex, Diuron
formaldehyde	
lindane	In head lice shampoos
orthophenylphenol	
pyrethrins	In many insecticide products

Possible Human Carcinogens

Active ingredient	Proprietary (Product) Names
acephate	Orthene
bromacil	Hyvar
carbaryl	Sevin
cypermethrin	Cynoff
dacthal	
dichlobenil	Casoron, Norosac, Barrier
dichlorvos	DDVP, Vapona
dimethoate	Defend, Cygon
fipronil	Max Force
hydramethylnon	Amdro, Max Force
isoxaben	Snapshot
oryzalin	Surflan
oxadiazon	Ronstar
oxyfluorfen	Goal
paradichlorobenzene	In moth balls
pendimethalin	Prowl, Stomp
permethrin	Flee, Dragnet, Vikor Wasp and Hornet
piperonyl butoxide	In many pyrethrin- and pyrethroid-containing insecticide products
propiconazole	Banner, Tilt
tetramethrin	Vikor Wasp and Hornet Killer, many others
trifluralin	Snapshot, Treflan

- Other studies have found associations between **parental occupational exposure to pesticides during pregnancy and childhood**, and elevated rates of **childhood leukemia and brain tumors** (Shu, 1988; Buckley, 1989; O'Leary, 1991; Daniels, 1997).

Harm to the Developing Brain and Nervous System

- Young children have **incompletely developed blood-brain barriers and protective sheathing of the nerves**. Significant brain development and structural alterations occur until at least 4-6 years of age. Thus children may be **especially vulnerable** to exposure to certain chemicals that are toxic to the nervous system (Watanabe, T, et al. 1990; National Research Council, 1993).

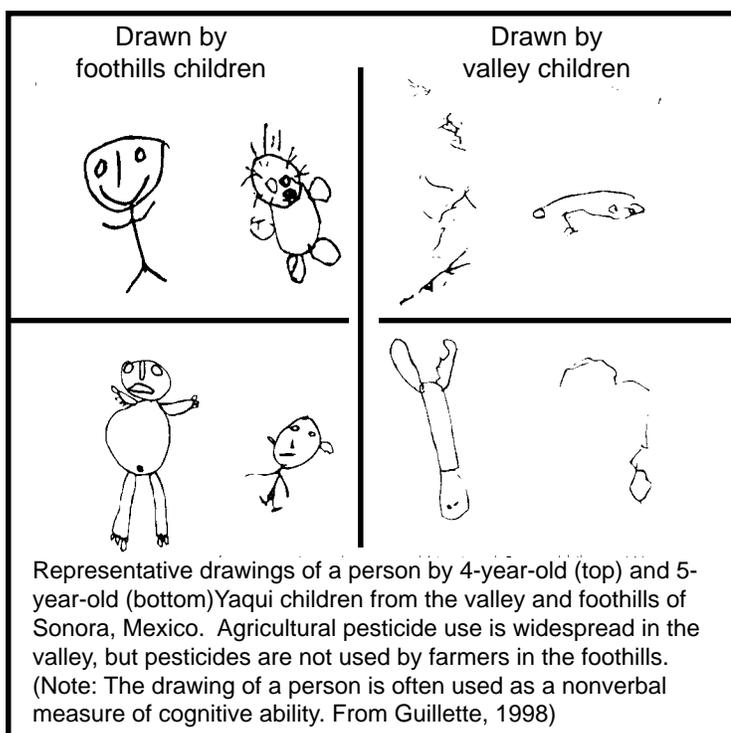


- The National Research Council, in a 1993 report, stated that “the data strongly suggest that exposure to **neurotoxic** [i.e., nerve poisoning] compounds at levels believed to be safe for adults could result in **permanent loss of brain function** if it occurred during the prenatal or early childhood period of development” (National Research Council, 1993).

- Exposure to **nerve poisoning pesticides** can cause **behavioral changes and impair learning and problem solving ability, activity level, memory, emotion, and even sight** (Ishikawa and Miyata, 1980; Wagner, 1993; Dementi, 1994; Keifer and Mahurin, 1997; Guillette, 1998; US EPA, 1997). Exposure to nerve poisons during infancy can lead to **severe and long-term impairment of motor and mental development** (Ecobichon, 1990).

- At least **four major classes of insecticides** (organophosphates, organochlorines, carbamates, and synthetic pyrethroids) are **nerve poisons** (Corbett, 1984; Ecobichon, 1990; Cremelyn, 1991; Rao, 1995; Reigart, 1999). Even some **weed-killing pesticides** have **neurotoxic** effects, including 2,4-D, dicamba and others (Ecobichon, 1990; Potter, 1993).

- Exposure to **nerve poisoning pesticides** caused **cerebral palsy-like symptoms** in one infant that resolved six weeks after a family left their pesticide-contaminated home (Wagner, 1993). A recent study of four and five year old children in Mexico found a **decrease in stamina, gross and fine eye-hand coordination, memory, and ability to draw a person** among the children most heavily exposed to **nerve poisoning pesticides** (Guillette, 1998).



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