12 Words You Need to Know

1 Pesticide

A substance used to kill or reduce the numbers of unwanted forms of life in a particular environment. These life forms may be unwanted plants ("weeds"), fungi, insects, or animals such as rats. Most pesticides are man-made chemicals, though a few are naturally derived from plants. Though efforts are made to choose pesticides which are toxic only to the intended target and not to humans or other living things, often pesticides have more general toxicity. Pesticides are widely used in schools, factories, offices, homes, public and private lands, and in farming. The use of pesticides has greatly increased in recent times. Many pesticides persist in the environment and can be found in air, water, soil, plants and animals (including the food we eat), and in our own bodies.

2 Herbicide

A substance used to kill plants. Some herbicides kill all plants with which they come into contact; these are often called defoliants. Others are more specific, affecting only certain types of plants, such as crabgrass or plants that are not grasses. Herbicides are used widely in home lawn care, farming, and for weed control in public areas (parks, streets, golf courses, and highway areas).

3 Fungicide

A substance used to kill fungi ("funguses"). Yeasts, molds, mildew, and mushrooms are examples of fungi.

4 Insecticide

A substance used to kill insects. These are very widely used in nearly every kind of human environment, including homes, gardens, apartment buildings, schools, office buildings, restaurants, bakeries, and farms. They are also applied directly on adults, children, and pets. The term "insecticide" is sometimes used when the target is not, strictly speaking, insects, for example, worms.

5 Carcinogen

A substance that causes cancer. "Carcinogenic" means "causing cancer."

6 Chlorophenol

A type of manmade chemical that contains chlorine atoms and a ring-shaped carbon structure. Chlorophenols have some similarity to naturally-occurring substances, except for the chlorine atoms. These chemicals are toxic to living organisms, even in tiny concentrations. Chlorophenols vary in their nature, uses, toxicity, and tendency to cause cancer.

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The phenoxy herbicides, frequently mentioned in our **Research Report**, are chlorophenols. So are DDT, PCB, TCDD, and many other chemicals now or formerly used in farming, landscaping, industrial processes, and home, school, and office pest control. These chemicals are sometimes called chlorinated (or halogenated — refers to the group of elements that includes chlorine) hydrocarbons, or organochlorines.

Even people who don't use these substances in their work may be exposed to them through drinking water, food, pesticide sprays used at home, school, work, home or business landscaping, and use on public lands such as parks and along highways. All people living in industrialized nations are exposed to these chemicals. We have residues of them in our body's own body fat, where such chemicals tend to persist. (See *dioxin/TCDD*, below)

7 Dioxin/TCDD

TCDD is 2,3,7,8-tetrachlorodibenzo-p-dioxin, also just called "dioxin." The numbers refer to the locations on the carbon structure where the four chlorine atoms are located. The term "dioxin" can also be applied to closely related chemicals.

One of the most toxic chemicals known, TCDD / dioxin occurs as a contaminant / byproduct when certain pesticides are manufactured.

It also gets into the air from incineration of chemical wastes and from certain industrial processes. Dioxin persists in the environment, breaks down very slowly, and tends to become concentrated in the fatty tissues of living animals and humans.

Unfortunately, we all have residues of chlorophenols in our own body fat.

Fish living in dioxin-contaminated waters contain much higher concentrations of dioxin than the water does.

Americans get 90% of their dioxin exposure by eating dairy products, meat, and fish. Since dioxin is concentrated in fatty tissues, it occurs in human breast milk. According to Dr. Sandra Steingraber, "a breast-fed infant receives its so-called "safe" lifetime limit of dioxin in the first six months of drinking breast milk." (Raffensperger, C. & Tickner, J., eds. *Protecting Public Health and the Environment*, Island Press, Washington, DC). Dioxin is also a hormone disruptor, even in concentrations much smaller than those that can cause cancer. Other health problems which some experts believe are linked to widespread dioxin contamination include the international epidemic of lowered sperm counts, the increase in breast cancer, and learning disabilities in children.

8 Case-control study

A study in which "cases" (people who have a disease) are compared with "controls" (people who don't have the disease). The differences between the two groups might reveal the cause of the disease. In our **Research Report**, "cases" are people with lymphoma; "controls" are people with no lymphoma. In designing a case-control study, scientists may consider such variables as age, gender, residence, occupation, race, military duty, etc. Sometimes several controls are selected for each case. Often the controls are selected at random from the same general population (hospital, state, etc.) where the cases are found. Good choice of cases and controls is a very important part of the design of all case-control studies.

9 Cohort study

A defined group of people (cohort) is followed up over time to observe their incidence of (or mortality from) a disease. The incidence or mortality in the cohort is compared either to the general population or to persons lacking the characteristic or exposure being studied.

10 Mortality study

A study of deaths from a particular disease (non-fatal cases are left out). A mortality study may have a cohort or case-control design. There is a weakness in the use of mortality studies for lymphoma, because many cases of lymphoma are not fatal. Since lymphoma survivors are ignored, the occurrence of lymphoma can appear lower than it really is.

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In some populations, exposure to carcinogens may increase the incidence of lymphoma at a relatively young age, resulting in higher than expected incidence but few deaths, since younger patients may better tolerate cancer treatments. Differences in access to treatment may affect mortality, and may differ from risk factors which affect incidence. Also, the cause of death recorded on a certificate sometimes does not reflect underlying illness. For instance, a death certificate may show the cause as kidney failure, but the kidney failure may have resulted from cancer chemotherapy. Still, mortality studies do provide useful information.

In the United States, it is often easier to conduct mortality studies than incidence studies because death records are easier to obtain than information about disease incidence. Norway, Finland, and England have complete records of every cancer case in their countries, making mortality studies less attractive as a study design (and incidence studies easier to carry out). These nations also have very complete data on the occupations of their citizens, which researchers can fairly easily match with cancer data for individuals.

NOTE: We have not attempted to define all types of study designs, but only to explain some of those which occur frequently in our

Research Report. For example, in a **meta-analysis**, a group of similar studies is evaluated for possible patterns or results not obtainable from the studies separately.

11 Odds ratio (OR)

Simply put, a measure of the risk of cancer for a study population (people exposed to a pesticide) divided by the risk for a population lacking the characteristic or exposure being studied (people not exposed to the pesticide). The odds ratio shows whether the group under study has more, less, or about the same chance of getting the disease as people who are not exposed to the pesticide.

12 Standard incidence ratio (SIR) and standard mortality ratio (SMR)

These, like the odds ratio, are ways of expressing the relationship of incidence (or mortality) from lymphoma in a study population to that in a reference group, except that in this case, the reference group is the whole population (of one country, usually).

Here's an example using *mortality figures*: Employees in certain pesticide factories had a SMR of 3.26 for non-Hodgkin's lymphoma. This means that 3.26 times as many people in that population died from non-Hodgkin's lymphoma as would have in a sample of the same size taken from the general population.

Here's an example using *incidence figures*: If in the population of the U.S., 15 cases of non-Hodgkin's lymphoma would be expected per 100,000 person-years, but in a study group of people exposed to a particular pesticide for a total of 100,000 person-years, 30 cases occurred, this would result in a SIR for non-Hodgkin's lymphoma in that group of 2.0 (twice the expected incidence).