Pesticides and cancer

Studies show that there may be a link between pesticides and cancer in adults and children.

Why there is concern
The research to date does not provide a conclusive link between pesticides and human cancer, but evidence does suggest a possible association. Research shows a link with non-Hodgkin lymphoma (NHL), leukemia, multiple myeloma, prostate, kidney, brain and lung. A number of studies, including a few in Canada, have found possible links between farmers exposed to pesticides and a higher risk of NHL.

The World Health Organization's International Agency for Research on Cancer (IARC) tests chemicals, including pesticides and pesticide ingredients, to find out if they cause cancer in people. The US National Toxicology Program has also identified some active ingredients in pesticides as "reasonably anticipated to be a human carcinogen" (likely to cause cancer). Its evaluations support the evidence that some pesticides have cancer-causing properties. The US Environmental Protection Agency also looks at the cancer-causing properties of pesticides.

Occupational (work-related) exposures
Most of the research on pesticides and cancer looks at occupational exposures. Occupational exposures are usually higher and longer than those experienced by the general public. Because of this, it is easier to measure and identify links between exposure and cancer risk in the workplace.

Over 100 studies looking at occupational exposures have been done since the 1980s. Some studies looking at cancer incidence (occurrence) and death rates among farmers suggest they may have a slightly higher risk than the average person of developing Hodgkin lymphoma, NHL and leukemia as well as myeloma, soft tissue sarcoma and cancers of the prostate and brain. For example, one study from the US Agricultural Health Study looking at people who apply pesticides, including farmers, found a high incidence of prostate cancer in the group. Also, a study of myeloid leukemias and workplace pesticide exposure, which included farmers and farm workers, suggests there may be a higher risk of myeloid leukemias linked to exposure.

Studies of migrant workers, gardeners, pesticide manufacturers, people who apply pesticides and golf course superintendents also suggest there may be a connection between pesticides and cancer. For example, a study looking at migrant and seasonal farm workers found a higher number of stomach cancer deaths than expected. A study on golf

course superintendents showed increased NHL, brain and prostate cancer death rates. However, results from these occupational studies are not as strong or consistent as the findings from studies looking at farmers.

Non-occupational (non-work-related) exposures
Studies on non-occupational exposures look at farmers' families and farm workers' families, people living in agricultural communities and others who may be exposed to pesticides through non-occupational ways.

Non-occupational exposures can include:

- exposure to pesticides used in the home or found in house dust (indoor residential exposure)
- indirect exposure in the community (bystander exposure)
- residues in food and water (dietary exposure)

Some research looking at non-occupational exposures suggests a possible link between pesticides and cancer, but the information is more limited than studies of occupational exposures. A study looking at organochlorine pesticides (a specific group of pesticides) and NHL suggests exposure to organochlorines possibly increases NHL risk. A few studies have also looked at the link between breast, testicular and pancreatic cancer and organochlorines. The general conclusion for breast cancer is that there is no association. The evidence for testicular and pancreatic is not clear. Another study compared pesticide contamination inside farm and non-farm homes. It found higher levels of agricultural pesticides in farm homes, showing pesticides taken into the home may add to pesticide exposure for farm families. More research is needed to understand if there is a link between cancer and pesticide residues in food and water.

Children and pesticides
Childhood exposures to pesticides usually come from:

- in and around the home and school
- residues in food and water
- contaminated air (drift) from agricultural and residential use
- residues brought into the home by family exposed at work

Another possible type of exposure is pre-natal (before birth). There is currently little research on pre-natal exposure and cancer risk.

Studies of pesticide and childhood cancers show a possible connection with leukemia, brain tumours and NHL.

Children are at risk of being exposed to higher levels of pesticides than adults:

- Certain behaviours increase their exposure – such as crawling and playing in grass or gardens treated with pesticides or putting contaminated objects in their mouth
- Pesticides can be absorbed through their skin more easily.
- They take in more air, water and food relative to their body weight compared to adults.

Pesticide exposure may do more harm to children because their bodies are still developing and may not be able to deal with these substances.

Children can also be exposed to potentially harmful pesticides through their parents. For example, there is evidence that children whose parents work with pesticides may have a small increase in risk of childhood cancer, particularly lymphoma. The potential link between childhood

brain cancer and parents' exposure to pesticides at work has also been studied, but no association has been found.

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