



# Cornell University Program on Breast Cancer and Environmental Risk Factors in New York State (BCERF)

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FACT SHEET #28

## Pesticides and Breast Cancer Risk, An Evaluation of Diazinon

*This fact sheet reviews the information currently available on whether or not diazinon affects the risk of breast cancer. Studies done so far do not indicate an increased breast cancer risk from diazinon exposure. However, diazinon is known to be toxic to the nervous system and unnecessary exposure to this insecticide should be avoided. We have included information on how diazinon is used, different ways by which people can come in contact with it, and how you can minimize your exposure to this chemical.*

### **What is diazinon and why was it chosen to be evaluated?**

Diazinon is a synthetic chemical used to kill insects (insecticide). It was selected to be evaluated because of its high use on fruit farms, in dairy barns, and homes, lawns and gardens in New York State (NYS). Diazinon is also a popular household insecticide. The widespread use of diazinon creates the potential for people to come in contact with it.

### **Does diazinon cause breast cancer?**

Currently available evidence does not suggest that diazinon causes breast cancer. Diazinon fed to laboratory animals over long periods of time did not cause a higher number of mammary (breast) tumors. However, whether or not diazinon has affected breast cancer incidence rates in women exposed to this insecticide in the past has not been studied.

### **Are there ways by which diazinon may affect breast cancer risk?**

Evidence for diazinon affecting breast cancer risk is very weak:

- The immune system helps us fight infections and cancer. In one study, young mouse pups born of females that were treated with diazinon were found to have temporary defects in their immune system. The defects in the immune

system did not last long and were not found after the pups matured. While these results suggest the need to study the effects of diazinon on the immune system, they do not provide evidence for diazinon affecting breast cancer risk.

- The female hormone estrogen can increase the growth rate of some breast tumor cells and has been linked to an increase in breast cancer risk. Diazinon does not act like the female hormone estrogen.
- Genetic damage to cells can sometimes lead to an abnormal increase in cell growth and the start of a tumor. Most studies done in animals, bacteria and cells growing in a laboratory have shown that diazinon does not cause genetic damage.

### **Does diazinon cause other kinds of cancer in people?**

Two studies have reported a small increase in cancer risk among people who were exposed to pesticides including diazinon. The risk for developing a type of cancer called nonHodgkin's lymphoma was found to be higher in men, but not in women farm workers who had used diazinon in the past. The small number of farm workers who had used diazinon had also used many other chemicals and pesticides. Another study found that families with a child diagnosed with brain cancer recalled having used pesticides including diazinon more often than families of cancer-free children. Again, the small number



of families who had used diazinon had also used many other chemicals and pesticides. In both these studies, the small number of cases and the many chemicals that were involved makes it difficult to determine if diazinon had a role in causing the cancer. Also, there is no good test to determine whether a person was exposed to diazinon many years ago. Researchers have to rely on people remembering all the pesticides and chemicals that they may have used in the past.

### Does diazinon cause other types of cancer in laboratory animals?

Cancer incidences in laboratory animals that were fed diazinon for long periods of time were not very different than in untreated animals in most studies. In one study, groups of male rats that were fed diazinon over long periods of time had an abnormal increased growth of some cells in the pancreas more often than untreated rats. Diazinon's effects on the pancreas should be studied further in experimental animals since pancreatic disease has also been reported in some cases of human poisonings with diazinon.

### Chemical Information, Usage and Trade Names for Diazinon

**Chemical family:** Organophosphate pesticide

#### Usage in the US:

**Agricultural:** 1.2 million pounds per year

**Home and gardens:** 2 to 4 million pounds per year

**Industrial and commercial applicators:** 3 to 4 million pounds per year

#### Some common trade names\*:

Alfatox<sup>®</sup>, AG<sup>®</sup> 500, Basudin<sup>®</sup>, Bazinon<sup>®</sup>, Dazzel<sup>®</sup>, Dessapon<sup>®</sup>, Dianon<sup>®</sup>, DiaTerr-Fos<sup>®</sup>, Diazatol<sup>®</sup>, Diazide<sup>®</sup>, Dimpylate<sup>®</sup>, D.Z.N.<sup>®</sup>, Neocidol<sup>®</sup>, Knoxout<sup>®</sup>, Drexel<sup>®</sup>, Diazinon, Diazol<sup>®</sup>, Diazonyl<sup>®</sup>, Diazudin<sup>®</sup>, Diagron<sup>®</sup>, Diazajet<sup>®</sup>, Dipofene<sup>®</sup>, Dizinon<sup>®</sup>, Dyzol<sup>®</sup>, Gardentox<sup>®</sup>, Kayazinon<sup>®</sup>, Kayazol<sup>®</sup>, Nipsan<sup>®</sup>, Nucidol<sup>®</sup>, Sarolex<sup>®</sup>, Spectracide<sup>®</sup>.

*\*Trade names are used herein for convenience and informational purposes only. No endorsements of products is intended and no criticism of unnamed products is implied.*

### How is diazinon used on farms?

Diazinon is used in orchards to protect fruit and trees from insect damage. It is used to keep flies away in greenhouses, mushroom houses, livestock barns and dairy farms. Diazinon is used to prevent soil insects and plant-eating insects from damaging vegetables, tobacco, rice, corn, alfalfa, potatoes, rangelands and pastures. It was used in the past on sod farms to keep away insects and worms. Diazinon use on sod farms and golf courses was stopped in 1986 after it was found to cause poisoning in some birds.

### What are non-farmland uses of diazinon?

Diazinon is commonly used in and around the home where people live. Some of its uses are listed below:

#### Common Non-Farmland Uses of Diazinon

Insects	Areas	Available as
flies and fly maggots mosquitoes cockroaches bedbugs ants spiders silverfish	<i>indoors:</i> homes and offices  <i>outdoors:</i> garbage dumps zoos and fairgrounds	liquid spray pest strips dust granules
ants spiders beetle larvae	house perimeters lawns and gardens	liquid spray dust granules
lice ticks fleas	on pets in animal facilities	animal dips flea collars animal ear tags

### Is diazinon found in food?

The Environmental Protection Agency (EPA) has set the maximum amount of diazinon that is permitted to remain in or on raw food at the time of harvest, called "tolerances." If food is found to carry diazinon residues at more than the tolerance levels, it may be seized and destroyed by federal or local authorities. A survey done by the Food and Drug Administration (FDA) between 1978 and 1982 found that people may be exposed to diazinon through some food items



made from wheat. The amounts of diazinon found in food items were below the tolerance levels and not considered a cause for concern. The two most recent FDA surveys done in 1996 and 1997 have not found any pesticide residues, including diazinon, above the tolerance levels in wheat.

### Is diazinon found in water?

Diazinon breaks down rapidly in water and its levels usually fall by half in a few days. Due to its increasing use in homes and on lawns, diazinon has been found more frequently in waters that drain out of urban areas than from farmlands. In a survey done in NYS, diazinon residues were found in six of the ten water samples collected from rivers and lakes around urban areas. The levels of diazinon residues found were lower than the health advisories set by EPA. EPA's health advisories are based on estimates of diazinon levels in drinking water that are not expected to cause any harmful health effects in people.

### Who might be exposed to diazinon?

People most likely to be exposed to this insecticide are:

- Farmers, agricultural, orchard and greenhouse workers who mix or apply diazinon, or work in areas that have been treated with this insecticide
- Workers who apply, or work with diazinon-treated animals in livestock and dairy barns
- Workers involved in the manufacture of diazinon
- Pest-control applicators who use diazinon to spray buildings, ornamental plants and indoor areas of commercial facilities and homes
- Veterinarians, pet groomers and pet owners who use diazinon-containing sprays or dips on animals against ticks or fleas, or who handle flea collars containing diazinon
- Home owners who spread granules containing diazinon around the outside of the house and on lawns, spray ornamental plants in homes and gardens, or handle pet flea collars that contain diazinon
- People who enter unventilated rooms too soon after diazinon has been sprayed

### How can I minimize my exposure to diazinon?

Diazinon kills insects by being toxic to their nervous system. High levels of this insecticide can also harm the nervous system of people. Diazinon levels in food and water are not considered a cause for concern. However, unnecessary exposure to this insecticide can be minimized as follows:

- Wash all vegetables and fruits with water before you cook or eat them.
- Follow manufacturer's guidelines when using any diazinon-containing product to treat your home, vegetable garden, lawn or ornamental plants. Wear the recommended protective clothing.
- Do not allow children or pets in the yard or lawn when pesticides are being applied.
- If you use a diazinon-containing product such as a pet spray, dip or flea collar, wear the recommended type of gloves during use and wash hands thoroughly after use. Wash hands after petting diazinon-treated animals.
- If you are getting your house, lawn or garden treated with pesticides, ask to see the labels of the products that will be applied. Cover or remove all food, cooking utensils and toys in indoor areas before treatment. Follow the manufacturer's guidelines on when to re-enter the treated areas.

### Conclusions

- Currently available evidence does not indicate that diazinon affects breast cancer risk.
- Diazinon fed to laboratory animals over long periods of time did not cause an increase in mammary tumors.
- Diazinon does not act like the female hormone estrogen. However, there is some evidence from only one study in mice that diazinon may temporarily affect the immature immune system.

### Where is more research needed?

- Diazinon's effects on the pancreas and the immature immune system should be studied further in experimental animals. Animals that were treated frequently with diazinon sprays, dips or wore flea collars over a long



time should be followed for immune or pancreatic effects.

### **Is more research being done?**

Researchers at the National Cancer Institute are conducting the "Agricultural Health Study". This study will evaluate the health effects of pesticides and farm chemicals in a large group of female and male agricultural workers from Iowa and North Carolina. There are three other ongoing studies at different campuses of the University of California. One study will investigate whether exposure of mice to combinations of low doses of many different chemicals causes a larger toxic effect, than when the animals are treated with single chemicals. Another study will investigate if there is an association between exposure to organophosphate pesticides and frequency of injuries among

500 Hispanic migrant farmworkers. A third study will compare different clothing materials used and the protection that they offer to pesticide applicators.

**An extensive bibliography on *Diazinon and Breast Cancer Risk* is available on the BCERF web site:  
<http://www.cfe.cornell.edu/bcerf/>**

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