



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

May 2000  
FACT SHEET #34

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

*This fact sheet reviews the information currently available on whether or not phosmet affects the risk of breast cancer. Studies done so far do not indicate an increased breast cancer risk from phosmet exposure. However, phosmet can cause harm to the nervous system and unnecessary exposure should be avoided. We have also included information on how phosmet is used, how people come in contact with it, and how to minimize contact with this chemical.*

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

Phosmet is a synthetic chemical used to kill insects (insecticide). It is a member of the organophosphate pesticides family. It was chosen for review because of its high use on fruit trees in orchards, an important industry in New York State (NYS). Phosmet has been found in the dust in homes of pesticide applicators who live close to orchard farms in Washington State. There is a concern that children of these workers may get exposed to phosmet.

### **Does phosmet cause breast cancer?**

Evidence available so far does not suggest that phosmet causes breast cancer. Experimental animals that were fed phosmet over long periods of time were not found to have a significantly higher number of mammary (breast) tumors than untreated animals. In one study, laboratory mice that were fed high doses of phosmet over a long period of time had a small, but not significant increase in a rare type of mammary tumor. A very small number of mice were examined in this study and it is difficult to determine if the small increase in mammary tumors was linked to phosmet treatments. Because such tumors are rare in mice, this study needs to be repeated. There have been no studies on breast cancer rates in women exposed to phosmet in the past.

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

One way by which a chemical may affect breast cancer risk is by acting like the female hormone estrogen. Long-term exposure to estrogen has been linked with an increase in

breast cancer risk. There were problems with the one (and only) study that tested phosmet for estrogen-like effects in laboratory rats. Hence, we do not know if phosmet can act like estrogen.

Another way by which a chemical may affect breast cancer risk is by increasing the effect of cancer-causing substances (carcinogens). Chemicals that increase the effect of other carcinogens are called *tumor promoters*. Phosmet was found to act as a tumor promoter in the liver and stomach of experimental rats. Rats that were fed phosmet after being injected with a carcinogen were found to have more *pre-cancerous* cells (abnormal looking cells that are known to develop into tumors), in their liver and stomach, than other rats that were injected with only the carcinogen. Phosmet's ability to promote mammary tumors has not been tested in laboratory animals.

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

There is no good evidence on whether phosmet causes cancer in people exposed to this insecticide in the past. Two studies have reported a small increase in risk of leukemia and non-Hodgkin's lymphoma (cancers affecting the blood) among farm workers who had used organophosphate pesticides, including phosmet. The number of farm workers who had used phosmet in these studies was too small to determine if phosmet played any role in causing these cancers.

### **Does phosmet cause other types of cancer in laboratory animals?**

There is some limited evidence that phosmet may increase the number of liver tumors in laboratory animals. Laboratory



male mice that were fed high levels of phosmet over long periods of time were found to have a slightly higher number of benign and malignant (cancerous) liver tumors than untreated mice. An increase in liver tumors was not seen in female mice, or in male and female laboratory rats that were fed phosmet.

### **Chemical Information, Usage and Some Common Trade Names for Phosmet**

**Chemical family:** Organophosphate pesticides

**Usage in the US (1990-1993 estimates):**

**Agricultural:** 941 thousand pounds per year

**Usage in NYS (1990-1993 estimates):**

**Agricultural:** 37 thousand pounds per year

**Usage in Apple Orchards in NYS (1995 estimate):**

49 thousand pounds per year

**Some common trade names\*:**

Fosmedan<sup>®</sup>, Cekumet<sup>®</sup>, Fosdan<sup>®</sup>, Imidan<sup>®</sup>,  
Prolate<sup>®</sup>, Inovat<sup>®</sup>, Inovitan<sup>®</sup>, Appa<sup>®</sup>, Kemolate<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 phosmet used in orchards and farms?**

Phosmet is used to control beetles, worms, aphids and fruitflies on fruit trees and vines. It is used to protect the following crops: alfalfa, potatoes, almonds, apples, pears, plums, cherries, blueberries, peaches, grapes and peas.

### **What are the non-farmland uses of phosmet?**

Phosmet is used to spray ornamental plants in nurseries. It is also available for homeowner use to control insect pests including moths, flies, beetles, weevils, lice, fleas and ticks. Phosmet is available in the form of dusts, wettable powders, concentrates, or in flea collars.

### **Is phosmet found in food or water?**

The US Department of Agriculture (USDA) collects information on pesticide use and residues in food through its Pesticide Data Program (PDP). In samples tested by PDP during 1995 to 1996, phosmet residues were not found in milk, canned peaches, potatoes, sweet corn, sweet peas or tomatoes. The levels of phosmet residues found in some fresh fruit samples were 100 times lower than the levels fed to laboratory mice in the studies described earlier. The phosmet residue levels found in food have been below the current *tolerances* set by the Environmental Protection Agency (EPA) for phosmet. A *tolerance* is the maximum amount of a specific pesticide or its break down products that is permitted to remain in or on foods (see BCERF Fact Sheet #25 on *Pesticide Residue Monitoring and Food Safety*).

Very low levels of phosmet are sometimes found for a few days in the drinking water of areas close to farms or orchards where phosmet has just been used. EPA does not consider exposure to these low levels of phosmet in drinking water to be a concern for human health.

EPA is reviewing the total exposure level of people to phosmet through food, water and its home use, as required by the Food Quality and Protection Act of 1996. Food tolerances for phosmet may change after this review. EPA has asked for more studies to be done with phosmet to better estimate the total exposure that people are likely to face.

### **Who might be exposed to phosmet?**

People most likely to be exposed to this insecticide include:

- Workers involved in the manufacture of phosmet
- Farmers, agricultural and orchard workers who mix or apply phosmet
- Anyone who enters or works in farms, orchards and other areas that have been recently treated with phosmet
- Children of applicators who live in homes near the areas where phosmet is sprayed
- Workers who treat or work with phosmet-treated animals in livestock and dairy barns
- Pest-control applicators at nurseries who use phosmet to spray ornamental plants



- Veterinarians, pet groomers and pet owners who use phosmet-containing powders or dips on animals against ticks or fleas, or who handle flea collars containing phosmet
- Anyone who sprays phosmet on ornamental plants in homes and gardens, or handles pet flea collars that contain phosmet.

### **How can I minimize my exposure to phosmet?**

Phosmet kills insects by being toxic to their nervous system. At high levels, this insecticide can also harm the human nervous system. Levels of phosmet found in food and water are not considered a cause for concern. However, unnecessary exposure to this insecticide, and other organophosphate pesticides can be minimized as follows:

- Wash all fruits and vegetables with water before you eat them.
- Follow manufacturer's guidelines on the label when using any phosmet-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 areas of the home, yard or lawn that is being treated. Follow the directions on the label on how long to keep everyone away from entering treated areas.
- If you use a phosmet-containing product such as a pet spray, dip, dust or flea collar, wear the recommended type of gloves during use and wash hands thoroughly after use. Wash hands after petting phosmet-treated animals.
- Do not bring into the house any equipment, shoes or clothes that were worn while using phosmet. Clothes that are worn while using phosmet should be laundered separately from the rest of the household laundry.

### **Conclusions**

Studies done so far do not indicate an increased breast cancer risk from phosmet exposure.

- Whether or not phosmet has affected breast cancer rates in women exposed in the past has not been studied.
- Phosmet fed to laboratory animals over long periods of time did not cause a significant increase in mammary tumors in these animals.
- Phosmet was found to act as a liver and stomach tumor promoter in experimental rats, but has not been tested for ability to promote mammary tumors.
- Phosmet does not last long in soil or water, and has not been found to be present in the environment at high levels.

### **Where is more research needed?**

- Larger epidemiological studies need to follow the incidence of leukemia and non-Hodgkin's lymphoma in farm workers and applicators who may have been exposed to phosmet.
- A small increase in a rare form of mammary tumors was observed in laboratory mice that were fed phosmet for a long period of time. Mammary glands were examined for only a few of the mice in this study and it was not clear if the increase was linked to phosmet treatments. This study needs to be repeated using a larger number of mice.
- Phosmet should be tested for its ability to promote mammary tumors in experimental rats that have been treated with mammary carcinogens.

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

Studies are being done to evaluate the effects of organophosphate pesticides, including phosmet, on the brain development of children of farm workers in California and Washington State. Another study is evaluating similar effects of organophosphate exposure from home use, in children living in the inner city regions of New York.



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

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