



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

Pesticides and Breast Cancer Risk, An Evaluation of Mancozeb

This fact sheet reviews the information currently available on whether or not mancozeb affects breast cancer risk. Studies done so far do not indicate an increased breast cancer risk from mancozeb exposure. We have included in this fact sheet information about how mancozeb is used, where it may be found, and how exposure to this chemical can be reduced.

What is mancozeb and why was it chosen to be evaluated?

Mancozeb is a synthetic pesticide. It has been in use since 1967 as a fungicide to prevent growth of fungi (molds) and to protect plants and crops against damage caused by fungi. Plants do not take up mancozeb from the soil. Mancozeb needs to be sprayed on surfaces of leaves and crops for protection against molds. It has been chosen for this evaluation since it is the most widely used fungicide in New York State (NYS). Low levels of a chemical called ethylenethiourea (ETU) are present in mancozeb formulations. Mancozeb breaks down to produce some ETU as well. ETU is known to be more harmful than mancozeb.

Does mancozeb cause breast cancer?

Evidence available so far is very limited but does not suggest that mancozeb causes breast cancer. Studies needed to make a conclusion about mancozeb's ability to cause breast cancer are not available. Breast cancer rates of women exposed to mancozeb in the past have not been studied. Studies of experimental animals treated with mancozeb have been done, but have not reported on mammary gland (breast) tumor incidence.

Are there ways by which mancozeb may affect breast cancer risk?

A substance that affects cancer risk by increasing the effect of other cancer-causing agents (carcinogens) is called a *tumor promoter*. Mancozeb was found to promote skin tumors in mice and pancreatic tumors in rats. Mancozeb has not been tested for its ability to promote mammary (breast) tumors in animals.

Does mancozeb cause other kinds of cancer in people?

Studies that have been done so far do not provide evidence for mancozeb causing other types of cancers in people. In one study, workers at a lawn-care company were found to have a higher number of deaths from a rare type of blood cancer called non-Hodgkin's lymphoma (NHL). While workers at this company had used mancozeb, the two workers who died from NHL had worked at a branch where mancozeb had not been used. Thus, mancozeb was unlikely to have caused NHL in these cases. In another study, rates of deaths from thyroid, bone and prostate cancer were found to be higher among white men in a region of Minnesota where mancozeb was used. Whether the men who died from



these cancers had been exposed to mancozeb was not determined in this study, and mancozeb was only one of many pesticides that were used in this region of Minnesota.

Chemical Information, Usage and Some Common Trade Names for Mancozeb

Chemical family: ethylene bisdithiocarbamate

Usage in the US (1997 estimates):

Agricultural: 7 to 10 million lbs per year

Usage in NYS (1990-1993 estimates):

Agricultural: 724,111 lbs per year

Usage in Apple Orchards in NYS (1997 estimate):

321,000 lbs per year

Some common trade names*: Dithane[®] M-45, Manzate[®] 200, Manzeb[®], Fore[®]

**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.*

Does mancozeb cause other types of cancer in laboratory animals?

High doses of mancozeb fed to mice for a long time did not cause an increase in number of tumors of any kind. However, in male rats fed high levels of mancozeb over a long time, there was an increase in number of benign and cancerous tumors in the thyroid gland. Doses of mancozeb fed to animals in these studies were more than a hundred times higher than the levels that humans could be exposed to through food. At such high doses of mancozeb, levels of ETU also increase and it is not clear if mancozeb, or the contaminating ETU causes the increase in thyroid cancer.

How is mancozeb used in orchards and farms?

Mancozeb is used as a fungicide for a variety of food crops, including potatoes, tomatoes, apples, wheat, corn, watermelons, safflower, sorghum, peanuts, flax, cereal grains, grapes and onions. It is also used for protection of cotton seeds.

What are non-farmland uses of mancozeb?

Mancozeb is available for use in homes and nurseries, for flowers, ornamental trees, shrubs, turf sod, and golf courses. It is also used in forests to control fungal diseases in evergreens such as conifer and fir trees.

Is mancozeb found in food or water?

Mancozeb is sometimes found in food in small amounts. Much of the mancozeb found in food can be washed off with water. Cooking foods that have mancozeb on them, without washing them, can lead to some of the mancozeb to breakdown into ETU. The US Environmental Protection Agency (EPA) has set limits called *tolerances* for mancozeb and ETU. A *tolerance* is the maximum amount of a specific pesticide or its break down products that is permitted to remain in or on foods.

Mancozeb breaks down in water within a day or two. Very low levels of ETU have been found in a few samples of water from areas where mancozeb was being used. However, water is not expected to be the source of significant exposure to mancozeb or ETU for people.

Who might be exposed to mancozeb?

People most likely to be exposed to this fungicide include:

- Workers involved in the manufacture of mancozeb
- Farmers, agricultural and orchard workers who mix or apply mancozeb
- Pilots who fly planes to spray farms, orchards or forests with mancozeb



- Workers at pine nurseries where mancozeb is used
- Home gardeners who use mancozeb containing sprays or dusts on ornamentals and shrubs

How can I minimize my exposure to mancozeb?

Levels of mancozeb and ETU found in food have been below EPA tolerance levels. Mancozeb does not last long in soil or water. However, following a few easy steps can help reduce exposure to this fungicide further:

- Wash all fruits and vegetables thoroughly with water before you eat them raw, and before cooking them.
- Read the label and follow manufacturer's guidelines when using any mancozeb-containing product to treat your home garden, or ornamental plants. Wear the recommended protective clothing.
- Do not allow children or pets in the areas of the garden that are being treated.

Conclusions

Studies done so far do not provide evidence for an increased breast cancer risk from mancozeb exposure.

- However, whether or not mancozeb has affected breast cancer rates in women exposed in the past has not been studied
- Mancozeb has been found to act as a skin and pancreatic tumor promoter in experimental animals but has not been tested for the ability to promote mammary tumors.

- Mancozeb does not last long in soil or water and has not been found to be present in the environment at high levels. People who do not use mancozeb are unlikely to be exposed to high levels of this fungicide.

Where is more research needed?

- Epidemiological studies need to follow the incidence of bone, prostate and thyroid cancers in farm workers and applicators who may have been exposed to mancozeb
- Studies of experimental animals exposed to mancozeb have been done. However, a report on mammary gland tumor incidence in mancozeb-treated animals was not available. A report of the mammary gland tumors in mancozeb-treated experimental animals is needed for an evaluation of its breast cancer risk
- Mancozeb 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?

An ongoing study of cancer risk among farm workers of Iowa and Minnesota, their spouses and children, will evaluate their exposure to mancozeb and various other pesticides. All cases of infertility among men will be investigated for exposure to pesticides, including mancozeb in a Minnesota based epidemiological study. Another study will be testing the ability of various chemicals, including mancozeb, to mimic sex hormones in cells growing in a laboratory. A study in Nebraska is investigating any association between Parkinsons disease and exposure to mancozeb, and other pesticides.



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

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