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A Healthy Ecosystem

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Some Pesticide Applicators at Higher Risk for Prostate Cancer

In results published in the May 2003 issue of the *American Journal of Epidemiology*, researchers from the National Institutes of Health reported a higher risk of prostate cancer in male pesticide applicators. The applicators were enrolled in the *Agricultural Health Study* sponsored by the National Cancer Institute, the National Institute of Environmental Health Sciences, and the Environmental Protection Agency (EPA).

Prostate cancer is the most common cancer in men in the United States. According to a report released by the National Cancer Institute and the Centers for Disease Control, prostate cancer rates ranked number one of all cancers for both white and African-American men. Farming is one of the jobs linked to a higher rate of prostate cancer.

But, until recently researchers have not been able to find out if there are specific types of pesticides or other chemical exposures on the farm that are linked to prostate cancer. The linkages have been difficult to make because most of the studies done in the past have been based on only a few hundred farmers.

The Agricultural Health Study

A new study, the *Agricultural Health Study*, is following over 55,000 men from Iowa and North Carolina who are professional pesticide applicators. Over 80% of the licensed pesticide applicators in both states are enrolled in the study, which started in 1993. This long-term study is designed to investigate whether expo-

sure to pesticides, or other farm practices, increases the risk of cancer and other illnesses that may take many years to develop.

Researchers asked many questions of the farmers before the any of the men in the study were diagnosed with prostate cancer. By using questionnaires, investigators asked the men whether they had or had not

ever used 50 different agricultural pesticides. For many of the pesticides they also asked how often, for how many years, and what method was used to apply the pesticides. They gathered information on the use of protective equipment such as gloves, hats and protective suits. Farmers were asked about their diet and lifestyle, including whether they smoked, exercised or



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Overall, the risk of prostate cancer was small—about 14% higher in men who were pesticide applicators compared to men living in the same state who were not applicators. Of the 50 pesticides studied, only exposure to the fumigant methyl bromide was consistently linked to a higher risk of prostate cancer.

The results of the Agricultural Health Study to date suggest that farmers who are pesticide applicators have a higher risk of prostate cancer, and this may be due to exposure to certain pesticides, including methyl bromide. Age and family history may also play an important role in prostate cancer risk in men exposed to certain pesticides.

Agricultural Health Study

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drank alcohol. Information was gathered on the farmer's age, ethnic background, family history of prostate cancer, and other factors that might affect the risk to this disease.

During the next four and a half years, 566 cases of prostate cancer were reported in the men enrolled in the study. Overall, the risk of prostate cancer was small—about 14% higher in men who were pesticide applicators compared to men living in the same state who were not applicators. Of the 50 pesticides studied, only exposure to the fumigant methyl bromide was consistently linked to a higher risk of prostate cancer. Applicators with high levels of exposure to methyl bromide had prostate cancer risk that was more than doubled. Those with very high exposure to methyl bromide had a 347% higher risk of prostate cancer.

For other pesticides, the data was not as clear. Most were not related to the risk of prostate cancer. For other pesticides, both age and family history played a role in whether they were linked to prostate cancer. In men over 50 years of age, there was a higher risk of prostate cancer if they had been exposed to the organochlorines aldrin, DDT or heptachlor (insecticides that are not used any more, but that stay in the environment for a long time), permethrin (used on livestock) or to carbofuran.

Exposures to certain pesticides were linked only to men who had relatives with prostate cancer. This included applicators with a father or brother with prostate cancer who were exposed to six different pesticides. They included butylate, a herbicide; the crop insecticides coumaphos, fonofos, chlorpyrifos, and phorate; and an insecticide used on livestock, permethrin. For most of these pesticides, prostate cancer risk was doubled in exposed applicators with a family history of prostate cancer. Men without a relative with prostate cancer did not have a higher prostate cancer risk if exposed to these six pesticides.

Following Into the Future

The investigators are seeking funding to continue the *Agricultural Health Study* for at least another 5 years to see if the higher rates of prostate cancer and links to specific pesticides are seen over time. These results also need to be confirmed by other studies. More information is needed to link actual exposures to pesticides with cancer rates. The *Agricultural Health Study* also plans to look at cancer rates in spouses of



farmers and professional female pesticide applicators. Over 33,000 women are enrolled in this study. Both breast cancer and ovarian cancer risk will be evaluated.

The results of the *Agricultural Health Study* to date suggest that farmers who are pesticide applicators have a higher risk of prostate cancer, and this may be due to exposure to certain pesticides, including methyl bromide. Age and family history may also play an important role in prostate cancer risk in men exposed to certain pesticides.

It's important that applicators take precautions to reduce exposures to pesticides, including frequent hand washing and using personal protective gear. It is hoped that regulatory agencies use the results of this study to evaluate the safety of pesticides used in agriculture.

For more information on the *Agricultural Health Study*, including background information, important findings and a listing of all relevant scientific publications, visit the study's Web site: <http://www.aghealth.org>.

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