

INTEGRATION EVALUATION

Making Conclusions About Environmental and Other Factors and Breast Cancer Incidence

Summary

Using the information learned from the three evaluations (see *Epidemiological Evaluation*, *Toxicological Evaluation* and *Environmental Exposure* fact sheets) State Health Department researchers are drawing some preliminary conclusions about some contaminants in the CMP area and possible health risks. Initially, six contaminants were evaluated. None are thought to be related to the elevated breast cancer occurrence or other health effects. The work is ongoing, especially for air contaminants, pesticides and private drinking water.

Integrating Prior Evaluations

In the integration evaluation, the three prior evaluations are re-examined to help understand possible relationships and identify any follow-up activities.

- **The epidemiological evaluation** considered whether known risk factors for breast cancer might account for the elevated breast cancer incidence in the CMP area. Our researchers developed a statistical model that considered race, income and educational level in addition to age, which was the only factor considered in the original ZIP Code-level maps. When breast cancer statistics were recalculated accounting for these additional factors, the overall breast cancer excess was reduced from 38% to 24%. If our researchers had more data about women in different communities, characteristics related to family history, lifestyle and reproductive factors might explain a larger percentage of breast cancer here and around the entire state. However, we cannot rule out the possibility that environmental risk factors could also play a role (see the *Epidemiological Evaluation* fact sheet for more details).
- **The toxicological evaluation** led to the development of a system for classifying substances as risk factors for human breast cancer. Our toxicologists classified about 150 substances using this system. The classification of

each substance was based on evidence from human, laboratory animal and other types of studies (see *Toxicological Evaluation* fact sheet for more details).

- **The environmental evaluation** identified possible exposures to elevated levels of contaminants in the CMP communities (see *Environmental Exposure* booklet for more details).

The following were considered in evaluating the likelihood that possible exposures to elevated levels of contaminants could be related to the elevated breast cancer incidence observed between 1993 and 1997.

- 1. The level of confidence in environmental data to characterize possible exposures.** Based on the environmental exposure evaluation, our researchers re-examined their confidence in the exposure data. They considered whether the data were actual measured values of the contaminant in an environmental medium to which people could have been exposed. They also considered whether the environmental data related to possible exposures for a time period important to the onset or development of breast cancer diagnosed between 1993 and 1997.
- 2. How the contaminant was classified as a risk factor for human breast cancer.** Our researchers evaluated whether the contaminant was a known, probable, possible, potential, unlikely or unclassifiable risk factor for breast cancer using our system for classifying substances as risk factors for breast cancer.
- 3. How likely is the estimated level of exposure to the contaminant to cause breast cancer or other health effects.** Our researchers assessed the risks of cancer and non-cancer health effects using standard procedures for evaluating potential health risks. They considered both the amount of the contaminant to which people were possibly exposed and the potency (or strength) of the contaminant.

A summary of the results of the integration evaluation for the six contaminants is provided on the following pages. Additional technical details can be found in *Chapter V. Integration Evaluation of the Coram, Mt. Sinai, Port Jefferson Station Breast Cancer Follow-up Investigation Working Draft Integration Report*.

Results

Outdoor Air

Ethylene thiourea (ETU)

The air concentration of ETU in the CMP area is based on US EPA estimates of outdoor air concentrations, not actual measured values of ETU in the air. These data estimate annual average air concentration in the CMP area for a single year, 1990, which is too late to be important to the onset and development of breast cancer diagnosed between 1993 and 1997. As a result, our overall confidence about exposure for ETU was ranked as low. The annual average level of ETU in the CMP area was estimated to be 0.00000009 micrograms per cubic meter.

ETU is classified as a “potential risk factor,” the weakest category showing any association to human breast cancer according to the system for classifying substances as risk factors for breast cancer.

Based on standard procedures for evaluating health risks, ETU is unlikely to be related to the elevated breast cancer incidence in the area. It is also unlikely to be related to non-cancer health effects. Therefore, this evaluation does not support a recommendation for additional follow-up of ETU in the CMP area.

Pesticides

2,4-D

The amount of 2,4-D applied by commercial applicators appears to be higher on a per square mile basis in the CMP area than in Suffolk County and New York State. However, our researchers need to resolve an issue about the reported 2,4-D data. By looking into these data further, they hope to have a better understanding about the use of 2, 4-D, as well as mecoprop and dicamba, throughout the state.

The data on 2,4-D applications are classified as use data, the weakest type of exposure information considered in this evaluation. The time period of the data was too late to be important to the onset or development of breast cancer diagnosed between 1993 and 1997. However, 2,4-D has been used for more than 50 years

and these use data could be considered representative of historic use. Our overall confidence about exposure for 2,4-D was ranked as low.

Published research has shown that pesticides, including 2,4-D, can be tracked into homes after lawn applications, and can remain in homes longer than outdoors. The literature indicates that for most people, indoor exposures to pesticide residues are likely to be a greater source of exposure than outdoor exposures. 2,4-D degrades more quickly outdoors than indoors.

Other researchers have measured the amount of in-home traces of 2,4-D in Midwestern homes and have estimated the indoor exposure of young children living in these homes. They also estimated the exposure from 2,4-D in food, the other likely major source of exposure. They found that the exposures from both sources were much lower than those associated with health risks. Those data were used in the evaluation of health effects describe below.

Recent studies show that 2,4-D does not cause cancer in animals. Human studies also show little evidence that 2,4-D causes cancer. It is classified as “unlikely to be a risk factor” for breast cancer. This is the most conclusive category showing no association with breast cancer.

Based on standard procedures for evaluating health risks, 2,4-D is unlikely to be related to the elevated breast cancer incidence in the area. It is also unlikely to be related to non-cancer health effects, based on exposure estimates in the literature. Therefore this evaluation does not support a recommendation of additional follow-up of 2,4-D as a risk factor in the CMP area. However, we will update the 2,4-D use information in the final draft report.

Drinking Water Contaminants in Public Water Supply Wells

Drinking water contaminants selected for this evaluation were those that either were detected at levels exceeding today’s drinking water standard of 5 micrograms per liter or were frequently detected in wells in the CMP area. In all cases the levels of the contaminants in drinking water are low and the number of people potentially exposed is small.

Our overall confidence about exposure for the four drinking water contaminants was ranked as high. These data provide measured levels of contaminants in public drinking water wells throughout the CMP area. They also span a time period, between 1971 and 2001, which is important to the onset and development of breast cancer diagnosed between 1993 and 1997.

1,1,1-Trichloroethane

1,1,1-trichloroethane was detected at low levels in drinking water wells that might have served four areas: Scott's Beach (1979-1988), Sound View Association (1979-1987), Crystal Brook (1977-1995) and the Coram Municipal Office building (1981-1987). The measured average concentrations in these wells ranged from about 8 micrograms per liter for the Coram Municipal Office Building to less than 1 microgram per liter for Crystal Brook.

1,1,1-trichloroethane is "not classifiable as a risk factor" for breast cancer in humans. This classification means that there is not enough evidence to classify this contaminant as a risk factor for breast cancer, although the potential for this contaminant to cause cancer is weak at best.

Based on standard procedures for evaluating health risks, 1,1,1-trichloroethane is unlikely to be related to the elevated breast cancer incidence in the area. It is also unlikely to be related to non-cancer health effects. Therefore, this evaluation does not support a recommendation for additional follow-up of 1,1,1-trichloroethane in the CMP area.

1,1-Dichloroethane

1,1-dichloroethane was detected at low levels in drinking water wells that might have served four areas: Scott's Beach (1987-1988), Sound View Association (1981-1987), Crystal Brook (1987-1991) and the Coram Municipal Office Building (1981-1987). The measured average concentrations in these wells ranged from about 4 micrograms per liter for Sound View Association to less than 1 microgram per liter for Crystal Brook.

1,1-dichloroethane is classified as a "potential risk factor" for human breast cancer, the weakest category showing any association to human breast cancer.

Based on standard procedures for evaluating health risks, 1,1-dichloroethane is unlikely to be related to the elevated breast cancer incidence in the area. It is also unlikely to be related to non-cancer health effects. Therefore, this evaluation does not support a recommendation for additional follow-up of 1,1-dichloroethane in the CMP area.

Carbon tetrachloride

Carbon tetrachloride was detected at low levels in drinking water wells that might have served the Crystal Brook area between 1977 and 1988. The measured average concentration in these wells was about 3 micrograms per liter.

Carbon tetrachloride is classified as a "potential risk factor" for human breast cancer, the weakest category showing any association to human breast cancer.

Based on standard procedures for evaluating health risks, carbon tetrachloride is unlikely to be related to the elevated breast cancer incidence in the area. It is also unlikely to be

related to non-cancer health effects. Therefore, this evaluation does not support a recommendation for additional follow-up of carbon tetrachloride in the CMP area.

Benzene

Benzene was detected at low levels in drinking water wells that might have served Crystal Brook area during a five month period in 1986 and 1987. The measured average concentration in these wells was about 4 micrograms per liter.

Benzene is classified as a "probable risk factor" for human breast cancer, the second highest category showing an association with human breast cancer. Based on standard procedures for evaluating health risks, benzene in drinking water is unlikely to be related to the elevated breast cancer incidence in the area because the length of exposure was so short. It is also unlikely to be related to non-cancer health effects. Therefore, this evaluation does not support a recommendation for additional follow-up of benzene in the CMP area.

Additional Efforts

The following efforts are being completed for the *Coram, Mt. Sinai, Port Jefferson Station Follow-up Investigation Final Draft Integration Report*.

Epidemiological efforts. State Health Department researchers are reviewing property records and the *Cole Cross Reference Directory* to collect some additional background information about how long women diagnosed with breast cancer lived in the area. Length of residence information is important for evaluating whether elevated contaminant levels could have resulted in exposure among the women diagnosed with breast cancer.

Environmental exposure data. More work will be done to evaluate additional possible environmental exposures and, if needed, to evaluate their associated health risks. Work is ongoing for air contaminants, pesticides and private drinking water.

Prioritize any recommended follow-up activities. Based on any remaining exposure and health risk evaluations, researchers will make final conclusions and recommendations in a final draft report which will be issued for public comment.

Make recommendations for future follow-up investigations. Because CMP is the first area being investigated using the Unusual Disease Pattern Protocol, recommendations will be provided on how to improve this protocol for future use.

About the Coram, Mt. Sinai, Port Jefferson Station Follow-up Investigation

The CMP Follow-up Investigation is being conducted as part of the New York State Cancer Mapping Project, also known as the Cancer Surveillance Improvement Initiative. This investigation follows the Unusual Disease Pattern Protocol, which was developed to conduct investigations in areas where the incidence of a disease is significantly greater than expected. This protocol is being used for the first time during the CMP Investigation to identify unusual environmental and other factors that may help to explain elevated breast cancer incidence in this seven ZIP Code area.

Teams of State Health Department researchers have prepared four evaluations as part of this investigation:

- **Epidemiological evaluation.** A team of epidemiologists has been analyzing breast cancer data, researching what is known about breast cancer and evaluating additional information on women living in this seven ZIP Code area.
- **Toxicological evaluation.** A team of toxicologists has been evaluating substances to characterize the likelihood that they are risk factors for breast cancer.
- **Environmental exposure evaluation.** With input from the communities, a team of environmental scientists evaluated a large number of existing environmental data sets to identify possible exposures to elevated levels of contaminants compared to other areas of the state.
- **Integration evaluation.** These research teams have been working collectively to integrate their results and evaluate health risks associated with estimated possible environmental exposures in terms of their relationship to breast cancer and other non-cancer health effects.

The CMP investigation is ongoing. Researchers are providing their findings to date in the ***Coram, Mt. Sinai, Port Jefferson Station Follow-up Investigation Working Draft Integration Report***.

**For more information contact
New York State Department of Health
(800) 458-1158 ext. 27530**

<http://www.health.state.ny.us/nysdoh/cancer/sublevel/follow.htm>