Chronic Disease & Environmental Epidemiology
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Northeast Minneapolis Community Vermiculite Health Study

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Background

From 1938 to 1989, raw vermiculite ore was processed at the Western Minerals Products plant located at 1720 Madison St. NE in Minneapolis. The mineral came from a mine in Libby, Montana and was used to make insulation, construction and gardening products. The plant also left behind a waste rock that was piled outside the plant and was offered as free "crush rock." People used the rock in their yards, gardens, and driveways. It is now known that the ore and the waste rock contained mineral fibers called "Libby Asbestos."

In 2000, the US Environmental Protection Agency (EPA) discovered that residential properties in the area were contaminated with Libby asbestos. EPA removed the waste, replacing it with clean fill. About 268 residential properties and the industrial site were cleaned up by 2004.

From 2001 to 2004, the Minnesota Department of Health (MDH) conducted an exposure investigation to assess the health risk in the community.[1] To learn more about the exposure, MDH interviewed current residents living near the site, former residents and owners of contaminated properties, former workers at the plant and their families. Workers at the plant had the highest asbestos exposure. Some residents were exposed from direct contact with the waste or played on the waste piles as children. People living within 1-2 blocks of the plant before 1972, were exposed to asbestos fiber levels in the air that were higher than normal city levels.

In 2012, the University of Minnesota reported the results of a health study of this group of NE Minneapolis residents with past exposure to Libby asbestos.[2] Chest x-rays found evidence of abnormalities (pleural scarring) among people who played on the piles as children or had higher exposure to asbestos in the air, confirming that asbestos exposure occurred at levels that could impact health.

What is the purpose of MDH's health study?

In this latest study, MDH is taking a closer look at whether Northeast Minneapolis residents, who were interviewed between 2001 and 2004 for the exposure investigation, actually experienced higher levels of asbestos-related diseases.

Serious lung diseases that are known to be caused by asbestos exposure are asbestosis, and two cancers: mesothelioma and lung cancer. Since these diseases can take a long time to develop, as much as 30-50 years, health scientists are not able to see the development of these diseases until many years after the exposure.

Vermiculite Ore Vermiculite Product

How is the study being done?

The study included all members of the community and worker/household study participants who were known or reported to be alive in 1988 and who gave written consent for further study (5,848 study participants).

Cancer cases were identified by matching information about study participants collected during the interview with records in the Minnesota cancer registry from 1988-2010. Lung cancer and mesothelioma were the cancers of interest, since inhaling asbestos fibers increases the risk of developing these two types of cancer.

The study participants' information was also matched to death records in Minnesota and to the National Death Index. From these records, MDH identified the date and cause of death for participants who died during the follow-up period (through 2011).

What have we found so far?

From 1988-2010, 52 lung cancer cases were found among the 2,900 women who were in the study (see table below). This is significantly higher than the 32 cases we expected based on the state rate. Among 2,948 men in the study, the number of lung cancers found was 66, higher than the 43 cases expected based on the state rate.

During this same time period, there were four women diagnosed with mesothelioma, significantly higher than expected. Three men were diagnosed with mesothelioma, which is more than expected but the difference is not statistically significant.

To be counted in the cancer registry, diagnosis has to take place in Minnesota; those diagnosed with cancer outside the state would not be included in the count.

Asbestos-related Cancers Diagnosed in NE Study Participants 1988‡-2010

Cancer	Men		Women	
	Observed	Expected	Observed	Expected
Lung cancer	66*	43	52*	32
Mesothelioma	3	1.26	4*	0.34

**The observed count is significantly elevated from the expected count.*
†"Expected" number is calculated based on MN state cancer rates in 1988-2010 and the size and age of the NE Minneapolis population.
‡1988 was the first year the MN cancer registry started collecting cancer information.

Discussion

Lung cancer has many causes; the largest risk for lung cancer is smoking, which accounts for 80-90% of lung cancers. Compared to state smoking levels in 2001, the percent of study participants who reported ever smoking was 12.8% greater in men and 14.4% greater in women. Therefore, the excess of lung cancer observed may be largely due to an excess of smoking.

Mesothelioma is a rare cancer that affects the lining of the lungs or abdomen. Unlike lung cancer, it is not caused by smoking; the great majority of cases have a history of exposure to asbestos. Traditionally, men are more likely to work in jobs with asbestos exposure and develop asbestos-related disease. This study showed that mesothelioma cancers were increased in women, which suggests that asbestos exposure was not limited to occupational exposure. The levels of exposure to Libby asbestos in the community may have contributed to the development of disease.

Next Steps

Further analysis will examine whether people with higher exposure were more likely to develop these cancers. Analysis of death certificate data will assess deaths due to lung cancer, mesothelioma, and other causes. Early findings are similar to the cancer results and show greater than expected mesothelioma and lung cancer deaths in women, but not in men. Results will be posted on the MDH website during the summer of 2014.

References in the scientific literature

1. Kelly, J. et al. (2006). Community Exposure to Asbestos from a Vermiculite Exfoliation Plant in NE Minneapolis. Inhalational Toxicology, 18(12), 941-947.

2. Alexander, B. et al. (2012). Radiographic Evidence of Nonoccupational Asbestos Exposure from Processing Libby Vermiculite in Minneapolis, Minnesota. Environmental Health Perspective, 120(1), 44-49.

For more information

About vermiculite and health:
www.health.state.mn.us/divs/eh/hazardous/sites/hennepin/western/index.html

About the Minnesota Cancer Surveillance System:
www.health.state.mn.us/divs/hpcd/cdee/mcss

About Minnesota Environmental Public Health Tracking
www.health.state.mn.us/tracking

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