IDPH Cancer Assessment, Willowbrook, Illinois
Frequently Asked Questions
March 2019

On August 21, 2018, the Agency for Toxic Substances and Disease Registry (ATSDR) released its "Evaluation of Potential Health Impacts from Ethylene Oxide Emissions" health consultation letter concerning Sterigenics International Inc. located in Willowbrook, Illinois. Sterigenics provides sterilization processes using ethylene oxide (EtO). Using air modeling data provided by the United States Environmental Protection Agency (U.S. EPA), ATSDR concluded that based on measured and modeled concentrations and the proximity to residences and other commercial structures, cancer risks higher than 1 in 10,000 people may exist for some community members and workers exposed to airborne EtO in this community. If these measured and estimated concentrations represent chronic exposures in the surrounding community (with higher exposures likely for workers of the facility), EtO emissions from the Sterigenics Corporation pose a public health hazard.

In its letter, ATSDR recommended that "IDPH investigate whether there are elevated cancers in the population surrounding the Sterigenics facility that are consistent with those associated with chronic EtO exposures." IDPH immediately began assessing cancer incidence in this community using data from the Illinois State Cancer Registry (ISCR). The ISCR has received gold certification from the North American Association of Central Cancer Registries for 20 consecutive years. Only those registries meeting the highest standards are awarded gold certification.

Q. What did this study find?

A. Incidence for certain cancers were increased among residents residing in areas surrounding the Sterigenics facility, while others were not.

Q. Did EtO cause cancer in Willowbrook?

A. We cannot confirm that EtO caused cancer in Willowbrook. This study is designed to look for correlations and CANNOT determine cause. A correlation between an exposure and cancer does not prove that the exposure caused the disease. Establishing the likelihood of a causative relationship between a chemical exposure and cancer requires multiple studies and multiple lines of evidence that consistently point to the link between the exposure and cancer.

Q. What cancers did you study?

A. IDPH examined all cancers and divided them into two groups. The first group included breast cancer and lymphohematopoietic cancers. Female breast cancer and certain

lymphohematopoietic cancers have consistently been associated with EtO. Lymphohematopoietic cancers include Non-Hodgkin's lymphoma, Hodgkin's lymphoma, myeloma, and lymphocytic leukemia. The second group included more common cancers such as prostate, ovarian, and bladder cancers.

Q. What cancer did you find? Which correlations were identified?

A. None of the three lymphohematopoietic cancers that previous studies have found to be associated with EtO, namely, non-Hodgkin's lymphoma, myeloma, and lymphocytic leukemia, were found to be increased in either males or females. However, another lymphohematopoietic cancer, Hodgkin's lymphoma, showed a statistically significant elevation among females.

Female breast cancer rates were also elevated relative to the state average, but the difference was reduced to non-significant when compared to the county average.

Non-Hodgkin's lymphoma rates have increased in females over time (1995 to 2015), and in recent years, its increased rate has reached statistical significance.

A separate analysis of pediatric cancer revealed that childhood lymphoma rates were also elevated.

Several other cancer sites that have never been documented to be related to EtO were found to be higher (i.e., prostate cancer for males, and pancreatic, ovary, and bladder cancers for females) and other sites were found to be lower (i.e., female leukemia and lung cancer) than comparable populations.

Q. What are the limitations of the study?

A. The study results should be treated with caution as the results were not quite consistent (e.g., male vs. female, and Hodgkin's vs. Non-Hodgkin's) and the study has several important limitations and constraints (e.g., using residency as measurement of exposure, tying cancer to the residence at the time of diagnosis, lacking other risk factors, etc.). Additional studies in the future are needed to confirm our findings.

A more detailed description of the study's findings can be found at http://www.dph.illinois.gov/topics-services/diseases-and-conditions/cancer.

Q. How did you determine the study areas?

A. In order to screen as many cancers as possible, two study areas were created. Study Area 1 is approximately 15 square miles and follows the EtO exposure map identified by the ATSDR. Study Area 2 is approximately 40 square miles, includes Study Area 1, and covers the majority of the zip code for Willowbrook, 60527.

To select appropriate study areas, we needed to consider three factors: scope, population, sample size. First, the scope of the exposure. We wanted to capture the affected area fully, but at the same time, we did not want to stretch the area so far that we might 'dilute' meaningful findings. Second, available population numbers to figure out cancer

excesses. The only population source was the U.S. Census Bureau and its population data are only available at certain geographical levels such as county, zip code tabulation area, or census tract. The census tracts were used in our study as the smallest building blocks to create the study areas. Third, sample size. We needed large enough numbers to do the analysis. An appropriate study area must meet all these three factors.

Q: Why wasn't the area I live in included as the study area?

A: Your area may not have been included in the study area for a couple of reasons. It may have been outside of the EPA air sampling/modeling area or in a different zip code than where the Sterigenics facility in Willowbrook is located.

Q: Is there any data available on the incidence of cancer of people working/attending school in the area?

A: All cancer cases who lived in the two study areas at the time of cancer diagnosis were included in the study, including people who were diagnosed with cancer while living in the area but later moved away. People who only worked or attended schools in the area but did not live in the area when cancer was diagnosed were not included.

Q. What data did you use?

A. The study used data from the Illinois State Cancer Registry (ISCR), which is the only population-based source for cancer incidence information in Illinois. Cancer cases are collected through mandated reporting by hospitals, ambulatory surgical treatment centers, non-hospital affiliated radiation therapy treatment centers, independent pathology labs, dermatologists and through the voluntary exchange of cancer patient data with other (mostly nearby) states. In June 2018, for the 2015 data, ISCR received its latest Gold standard – the highest standard for registry certification from the North American Association of Central Cancer Registries.

Q. Why didn't you talk to people and doctors?

A. Interviewing individuals in study areas can be fraught with inconsistencies and inaccuracies due to errors in recollection, known as recall biases and errors. For example, a person who thought they, or their neighbor, had colon cancer, actually might have stomach cancer. Some studies compared what people recalled to what was in their medical records, and found large discrepancy, sometimes as much as 60-80%. This recall bias can also be applied to risk factors. If a person suspected that something was causing their cancer, they might remember that better than someone who did not make that connection. The cancer information for this assessment came from medical records and pathology reports.

Q. How did you decide what years of data to use?

A. IDPH used data covering 21 years, from 1995 to 2015. The 21 years of data cover the years of operation of Sterigenics. It also allows for the typical cancer latency period, the time between when a person is exposed and when they are diagnosed. The latency period for lymphohematopoietic cancers (found to associated with EtO exposure) is 4-10 years and 10-15 years for solid tumors.

We also wanted to use the best data we have in terms of data completeness and quality. The data before 1995 were not as good because the cancer registry was just established, and the collected data were not certified by the North American Association of Central Cancer Registries (NAACCR). The data years we used for this study, 1995-2015, included the Gold Standard certified data and the most recent data (2015) available.

Q. Should I move?

A. IDPH is not making any recommendations about moving. While it sounds concerning, the total percent increase observed over the total number of expected cancer cases during the 21-year period was less than 5%. Many Illinois counties have cancer rates that differ from each other by more than 5%.

Q. Does this study conclude that Sterigenics should be shut down?

A. More study is needed to confirm the findings of this assessment and cancer incidence as it relates to EtO.

Q. How long does a person have to be exposed?

A. U.S. EPA Cancer Risk Estimates reviewed by ATSDR show cancer risk for this residential location is an additional risk of six cancers in a population of 1,000 residents who could have a lifetime exposure to EtO emissions from Sterigenics.

Q. How much EtO does a person have to be exposed to?

A. U.S. EPA calculated an inhalation unit risk value, which can be found in the ATSDR "Evaluation of Potential Health Impacts from Ethylene Oxide Emissions" letter.

Q. Am I at risk for future cancer?

A. Everyone is at risk for cancer. Not all people develop the same disease for the same reason (i.e., no one factor determines whether an individual will develop a disease). It is the interaction of many factors that produce disease (e.g., for cancer this could be genetics, immunity, diet, occupation, hormones, viruses, socioeconomic, lifestyle, age, or physical environment).

Cancer does not develop immediately after contact with a cancer-causing agent (carcinogen). The time between the exposure to a carcinogen and medical diagnosis of cancer, called latency period, is often 10 to 20 years. This makes it very difficult to pinpoint what caused the cancer. Cancers are usually related to long-term lifestyle behaviors (e.g., smoking) or significant exposure to carcinogens for many years.

Q: Where should I go if I have further cancer-related questions?

A: Please contact the IDPH Division of Epidemiologic Studies, email: ethyleneoxide-cancer@illinois.gov

Basic Cancer Facts

Lifetime risk for cancer

Cancer is a common disease, perhaps more common than many people realize. In the U.S., one in two men has a lifetime risk of developing cancer. For women, the lifetime risk is one in three. The number of people with cancer is increasing in most communities because more people are living to the ages of greatest cancer occurrence.

Many people could reduce their chances of developing or dying from cancer by adopting a healthier lifestyle and by visiting their doctor regularly for cancer-related checkups. Screening examinations, conducted regularly by a health care professional, can result in the detection of cancers of the breast, tongue, mouth, colon, rectum, cervix, prostate, testis, and melanomas at earlier stages, when treatment is more likely to be successful. More than half of all new cancer cases occur in the nine screening-accessible cancer sites listed above.

Current understanding about causes of cancer

The causes of most cancers are not well understood. Current knowledge suggests that many cancers are influenced by a combination of factors, including heredity, environment, and behaviors related to how we live, called lifestyle behaviors. Lifestyle behaviors that increase cancer risk include cigarette smoking, alcohol use, diet, obesity, and lack of physical activity, and they account for the majority of all cancer deaths in the United States. Environmental and occupational exposures to cancer-causing chemicals, ionizing radiation, and other agents produced by humans also significantly contribute to cancer risk. A recent World Health Organization report (2006) concluded that 16% of cancers in men (other than lung cancers) and 13% in women were attributable to environmental and occupational exposures in developed countries.

Cancer has multiple causes and factors, and takes many years to occur

It is a common perception that cancer is a single disease. In fact, cancer is many different diseases, each with differing rates of occurrence, risks, causes, and chances of survival.