Questions and Answers About

Cancer: Causes and Clusters

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Introduction

Concerns about cancer clusters can begin when people notice that several relatives, friends, neighbors, or coworkers have been diagnosed with cancer. Though the majority of suspected cancer concerns are determined not to be cancer clusters, when reported, cancer cluster concerns are taken very seriously and investigated through a systematic process to determine if science is able to provide helpful information.

The Maryland Cancer Registry at the **M**aryland **D**epartment of **H**ealth and **M**ental **H**ygiene (**DHMH**), in collaboration with the DHMH Environmental Health Bureau and the Maryland Department of the Environment, work in conjunction with local health departments to thoroughly investigate all suspected cancer concerns reported by the public.

The purpose of this booklet is to give a brief overview about cancer clusters and provide information about how cancer clusters concerns are investigated in the state of Maryland.

What is Cancer?

The term *cancer* refers to a group of over 100 diseases that begin when damaged cells in the body divide without control and eventually may invade other parts of the body. The cancer facts listed below should be kept in mind when the health department receives a report from a person about a suspected cancer cluster in his or her neighborhood or workplace.

Cancer is very common.

Cancer is the second leading cause of death in the United States and in the state of Maryland, and caused of death of 23 percent of Marylanders in 2011[1]. According to the American Cancer Society, not counting skin cancer, men have a 1 in 2 chance of developing cancer and women have a 1 in 3 chance of developing any cancer in their lifetimes[2]. According to the National Cancer Institute, the following are a few of the cancers types diagnosed with the greatest frequency in the United States (excluding non-melanoma skin cancers): breast, colon and rectum, lung and bronchus, and melanoma[3].

Given these statistics, it is not unusual to learn that several people in a neighborhood or workplace may have had cancer.

Cancer causes are still not well understood.

Science has identified more than a hundred different kinds of cancer, many of which have different, and most of the time, unknown causes[4].

Though scientists have made progress in understanding and treating cancer in our lifetimes, there is still much that is unknown about why certain people get cancers and what causes it. The latest studies show that the causes of cancer may have to do with complex relations between an individual's genetics, lifestyles and exposures, which can be very challenging to measure.

Is cancer caused by toxic substances in the environment?

Exposure to toxic substances, or carcinogenic (cancer causing) agents in occupational, community, and other setting are only known to account for a relatively small percentage of cancer deaths – about 4% from occupational exposures and 2% from environmental pollutants (man-made and naturally occurring)[5]." That said, there are carcinogens which are proven to have an increased association with the development of cancer, for example, smoking has been proven to be a definitive cause of lung cancer. However, it is often not so simple; some carcinogens are associated with some cancers and not others, as is the case for radiation and benzene, which are risk factors for certain types of leukemia, but not for colon cancer[6] [7]. As a result of cancer's complex causes, we cannot immediately assume that cancers occurring in one place or at one time share a common cause.

Lifestyle factors may account for a large number of cancers

Potentially modifiable lifestyle factors such as smoking or other tobacco use, diet, obesity, and lack of exercise are believed to account for approximately 65% of all cancer deaths in the US. Lifestyle factors often cluster in communities, as people tend to adopt the same habits and diet as their family, friends, and neighbors.

The risk of developing cancer increases with age and varies with gender.

Age is the most important risk factor for developing cancer; about three out of four people diagnosed with cancer in the United States are age 55 years or older[2]. Therefore, a community of older adults should be expected to have a higher number of cancers than a community with younger people or with a range of age groups. In addition, sex is a very important risk factor for different cancers. This is one of the reasons that it is important to calculate age- and sex-standardized rates for cancer.

Cancers diagnosed today are usually related to events that happened many years ago.

https://www.planning.org

Cancer is caused by both internal factors (such as gene mutations, hormones, age, and immune conditions) and external factors (such as exposures to tobacco, ultraviolet radiation, and chemicals) that may act together or alone to initiate or promote the growth of a cancer. Ten or more years often pass between the first cell mutations or a harmful exposure and the development of detectable cancer (known as the latency period). This long latency period makes it very difficult to pinpoint the specific causes of many cancers.

What is a Cancer Cluster?

A cancer cluster is a larger than usual number of the same cancers occurring during the same time period among people who live or work near each other.

How commonly are cancer clusters reported, and how often do they occur?

According to a 2004 study[8], most reported situations do not fit the scientific definition of a cancer cluster. In 5% to 15% of situations, formal testing confirms that the number of cases of a specific cancer in a community exceeds the expected number; however, in the majority of cases, science is unable to identify the specific hazards causing the cancer.

Cancer clusters can occur by chance

For some cancer types and some geographic areas, a small number of cases may be enough to change an area's cancer rate from below average to above average. While the increase may be real, the additional cases may simply be the result of variations that occur randomly or by chance, and are not due to a single cause. Small communities tend to be more different from average because they have smaller number of experiences, while larger communities tend to be closer to average.

How are Concerns about Possible Cancer Clusters Addressed in Maryland?

A cancer cluster investigation is a scientific review or analysis of a suspected cancer cluster, conducted to determine whether it meets all the elements of the cancer cluster definition. In general, a cancer cluster investigation is conducted in cases where scientists determine, based on the information available, that a study can provide answers[9].

What types of questions are asked in addressing concerns about suspected cancer clusters?

When investigating cancer concerns, scientists will evaluate a number of factors including:

- Are there multiple cases of a specific and/or rare type of cancer?
- Is there a larger than usual number of cancer cases in an area of concern during a specific time period?
- Do these cancers occur in a particular age group that does not usually get that type of cancer?
- Is reliable data available to learn more about possible exposures or risk factors?
- Is this increase in cancer cases a matter of random chance?
- How long have these individuals lived and/or worked at the location of concern?
- Is there good quality data available to do a full cancer cluster investigation?

Who addresses concerns about suspected cancer clusters?

Reports of suspected cancer clusters are taken very seriously by both local and state health departments, and the following agencies often work together to investigate a cancer concern.

Local health departments are the first point of contact for individuals reporting suspected cancer clusters, and are often most knowledgeable about local health and environment issues, and local residents' concerns.

State health department

Maryland Cancer Registry (DHMH) – collects information on cancer and cancer patients every year from medical facilities across the state, which is used to provide helpful data during suspected cancer cluster investigations.

Environmental Health Bureau (DHMH) – coordinates activities between the local and state health department and determines whether a scientific investigation is possible.

Maryland Department of the Environment (MDE) – Provides support in the event suspected cancer clusters potentially involve environmental contaminants or concerns.

Other state agencies may be asked to provide information for a suspected cancer cluster investigation, as needed.

Step 1: Gather Initial Contact Data and Concerns

The first step in a cancer cluster investigation involves gathering information to understand the nature of cancer concern.

If possible, it is helpful for investigators to collect as much information as possible on each individual with cancer who is thought to be part of a suspected cancer cluster. This information may include, age, sex, and year of diagnosis, in addition to data on the suspected risk factor exposure and the location of the individual at the time of exposure. It is also helpful to know the primary location in the body of each reported cancer because cancers that begin in different body locations generally have different causes and characteristics. The geographic place of residence at the time of diagnosis or exposure of the person with cancer should be known; if a cancer was diagnosed when the person lived or worked in another location, then they may not be considered part of the suspected cluster.

Step 2: Evaluate the Concerns and Conduct a Preliminary Analysis

If the possibility of a cancer cluster cannot be ruled out after studying the initial information, investigators will conduct a preliminary analysis. Numbers of cancer cases and cancer rates from the Maryland Cancer Registry are used to evaluate whether the rate of cancers is higher than expected and if so, how likely it is that an increase in cancer rates occurred by chance. Maryland Cancer Registry data are available only to certain health officials in Maryland because data are confidential and protected by law.

In this step, investigators compare the actual number of cancer cases with the number of cancer cases that are statistically expected based on known information about the cancer rate in that county or in Maryland as a whole. If the observed number of cancer cases is less than the expected number of cases, then a cancer cluster can be ruled out and the investigation is complete.

If the observed number of cancer cases is more than the expected number, further statistical tests are conducted to confirm whether it occurred as a result of random chance. If it is determined that the suspected cluster was not due to random chance, a more detailed investigation may be necessary.

Step 3: Determine if an Investigation is Feasible

If data indicate that the number of reported cancer cases in an area is not due to random chance, then steps are taken to determine if enough scientific information is available to conduct a proper cancer cluster epidemiologic investigation. This information includes whether there is just one type of cancer in an area or more than one type that are closely related to one risk factor; if known risk factors exist in the area of concern, and if so, the amount of exposure an individual had to the suspected risk factor; and if there are enough individuals that can be studied to do a proper investigation of the cancer concern. If only a small number of cases are found, it can be difficult to scientifically link those cancer cases to one cause.

Step 4: Conduct a Cancer Cluster Investigation

The goal of this phase is to perform a scientific investigation of the relationship between risk factor and cancer cases. The steps necessary to determine definitively why the cancer rate is elevated may take months or years to complete; and even then, often a cause cannot be found.

However, in cases where a specific modifiable risk factor is identified, measures for protecting the public and actions to remove or reduce modifiable risks are implemented. This could involve implementing community smoking cessation programs, cancer screenings, or removing environmental hazards.

Conclusion

The combined experience of local and state health agencies involved in suspected cancer cluster investigations suggests that statistically significant cancer clusters are extremely rare. Only about two of every 1,000 reports of suspected cancer clusters reach the step where further investigation is required to identify common risk factors. Despite that, every call regarding a cancer cluster report is very important to the agencies that receive them, and are an opportunity to learn more about cancer, find the best ways to reduce risk, increase public understanding of cancer risk, and improve the ability of agencies to promote cancer prevention activities and protect the people of Maryland.

For more information, please visit the DHMH Cancer Cluster webpage at: http://phpa.dhmh.maryland.gov/cancer/Pages/Cancer-Clusters.aspx

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