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## Fact Sheet

### In English

**Reviewed:** 03/18/2014

## Cancer Clusters

### Key Points

- A cancer cluster is the occurrence of a greater than expected number of cancer cases among a group of people in a defined geographic area over a specific time period.
- A suspected cancer cluster can be reported to a state or local health department. These agencies provide the first response to concerns about cancer clusters.

#### 1. **What is a cancer cluster?**

A cancer cluster is the occurrence of a greater than expected number of cancer cases among a group of people in a defined geographic area over a specific time period. A cancer cluster may be suspected when people report that several family members, friends, neighbors, or coworkers have been diagnosed with the same or related types of cancer.

Cancer clusters can help scientists identify cancer-causing substances in the environment. For example, in the early 1970s, a cluster of cases of angiosarcoma of the liver, a rare cancer, was detected among workers in a chemical plant. Further investigation showed that the workers were all exposed to vinyl chloride and that workers in other plants that used vinyl chloride also had an increased rate of angiosarcoma of the liver. Exposure to vinyl chloride is now known to be a major risk factor for angiosarcoma of the liver.

However, most suspected cancer clusters turn out, on detailed investigation, not to be true cancer clusters (see Question 4). That is, no cause can be identified, and the clustering of cases turns out to be a random occurrence.

#### 2. **Where can someone report a suspected cancer cluster or find out if one is being investigated?**

Concerned individuals can contact their local or state health department to report a suspected cancer cluster or to find out if one is being investigated. Health departments provide the first response to questions about cancer clusters because they, together with state cancer registries, will have the most up-to-date data on cancer incidence in the area. If additional resources are needed to investigate a suspected cancer cluster, the state health department may request assistance from

federal agencies, including the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR), which is part of the CDC (see Question 5).

The CDC website provides links to state and local health departments. These agencies may also be listed in the blue pages of government listings in telephone books.

Although NCI does not lead investigations of individual cancer clusters, NCI researchers and staff may provide assistance to other investigative agencies as needed. In addition, scientists at NCI and researchers who are funded by NCI analyze variations in cancer trends, including the frequency, distribution, and patterns of cancer in groups of people. These analyses can detect patterns of cancer in specific populations. For example, NCI's Cancer Mortality Maps website uses data on deaths from the National Center for Health Statistics, which is part of the CDC, and population estimates from the U.S. Census Bureau to provide dynamically generated maps that show geographic patterns of cancer death rates throughout the United States.

### **3. How are suspected cancer clusters investigated?**

Health departments use established criteria to investigate reports of cancer clusters. The Centers for Disease Control and the Council of State and Territorial Epidemiologists have released updated guidelines for investigating suspected cancer clusters and responding to community concerns (1).

As a first step, the investigating agency gathers information from the person who reported the suspected cancer cluster. The investigators ask for details about the suspected cluster, such as the types of cancer and number of cases of each type, the age of the people with cancer, and the area and time period over which the cancers were diagnosed. They also ask about specific environmental hazards or concerns in the affected area.

If the review of the findings from this initial investigation suggests the need for further evaluation, investigators then compare information about cases in the suspected cluster with records in the state cancer registry and census data.

If the second step reveals a statistically significant excess of cancer cases, the third step is to determine whether an epidemiologic study can be carried out to investigate whether the cluster is associated with risk factors in the local environment. Sometimes, even if there is a clear excess of cancer cases, it is not feasible to carry out further study—for example, if the total number of cases is very small.

Finally, if an epidemiologic study is feasible, the fourth step is to determine whether the cluster of cancer cases is associated with a suspect contaminant in the environment. Even if a possible association with an environmental contaminant is found, however, further studies would be needed to confirm that the environmental contaminant did cause the cluster.

### **4. What are the challenges in investigating suspected cancer clusters?**

Investigators face several challenges when determining whether a greater than expected number of cancer cases represents a cancer cluster.

#### **Understanding the kind of cancers involved**

To assess a suspected cancer cluster accurately, investigators must determine whether the type of cancer involved is a primary cancer (a cancer that is located in the original organ or tissue where

the cancer started) or a cancer that has metastasized (spread) to another site in the body from the original tissue or organ where the cancer began (also called a secondary cancer). Investigators consider only the primary cancer when they investigate a suspected cancer cluster. A confirmed cancer cluster is more likely if it involves one type of cancer than if it involves multiple different cancer types. This is because most carcinogens in the environment cause only a specific cancer type rather than causing cancer in general.

#### **Ascertaining the number of cancer cases in the suspected cluster**

Many reported clusters include too few cancer cases for investigators to determine whether the number of cancer cases is statistically significantly greater than the expected number.

#### **Determining statistical significance**

To confirm the existence of a cluster, investigators must show that the number of cancer cases in the cluster is statistically significantly greater than the number of cancer cases expected given the age, sex, and racial distribution of the group of people who developed the disease. If the difference between the actual and expected number of cancer cases is statistically significant, the finding is unlikely to be the result of chance alone. However, it is important to keep in mind that even a statistically significant difference between actual and expected numbers of cases can arise by chance.

#### **Determining the relevant population and geographic area**

An important challenge in confirming a cancer cluster is accurately defining the group of people who should be considered potentially at risk of developing the specific cancer (typically the total number of people who live in a specific geographic area). When defining a cancer cluster, there can be a tendency to expand the geographic borders as additional cases of the suspected disease are discovered. However, if investigators define the borders of a cluster based on where they find cancer cases, they may alarm people about cancers that are not related to the suspected cluster. Instead, investigators first define the population and geographic area that is "at risk" and then identify cancer cases within those parameters.

#### **Identifying a cause for a cluster**

A confirmed cancer cluster—that is, a finding of a statistically significant excess of cancers—may not be the result of any single external cause or hazard (also called an exposure). A cancer cluster could be the result of chance, an error in the calculation of the expected number of cancer cases, differences in how cancer cases were classified, or a known cause of cancer, such as smoking. Even if a cluster is confirmed, it can be very difficult to identify the cause. People move in and out of a geographic area over time, which can make it difficult for investigators to identify hazards or potential carcinogens to which they may have been exposed and to obtain medical records to confirm the diagnosis of cancer. Also, it typically takes a long time for cancer to develop, and any relevant exposure may have occurred in the past or in a different geographic area from where the cancer was diagnosed.

### **5. Where can people get more information about cancer clusters?**

In addition to state and local health departments and cancer registries, the following agencies may have more information about cancer clusters.

#### **Agency for Toxic Substances and Disease Registry (ATSDR) Centers for Disease Control and Prevention**

1-800-232-4636 (1-800-CDC-INFO)

<http://www.atsdr.cdc.gov>

The CDC's ATSDR conducts public health assessments of potentially hazardous waste sites, performs health consultations on specific hazardous substances, designs and conducts health surveillance programs, and provides education and training about hazardous substances. Information about public health assessments conducted by ATSDR can be found on its *Public Health Assessments and Health Consultations* page. Reports can be searched by state or U.S. territory. Contact information for ATSDR regional offices is available online.

**National Center for Environmental Health (NCEH)  
Centers for Disease Control and Prevention**

1-800-232-4636 (1-800-CDC-INFO)

[cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)

<http://www.cdc.gov/nceh/clusters>

The CDC's NCEH works to promote healthy and safe environments and prevent harmful exposures. The NCEH website includes general information about cancer clusters, links to resources, and answers to frequently asked questions.

**National Institute for Occupational Safety and Health (NIOSH)  
Hazard Evaluation and Technical Assistance Branch  
Health Hazard Evaluation (HHE) Program  
Centers for Disease Control and Prevention**

513-841-4382

[HHERequestHelp@cdc.gov](mailto:HHERequestHelp@cdc.gov)

<http://www.cdc.gov/niosh/hhe>

The HHE Program of CDC's NIOSH investigates potentially hazardous working conditions, including suspected cancer clusters. Employees, authorized employee representatives, and employers can request these evaluations. HHE reports are available on the NIOSH website.

**Office of Occupational Medicine  
Occupational Safety and Health Administration (OSHA)  
U.S. Department of Labor**

202-693-2323

<http://www.osha.gov/dts/oom/index.html>

OSHA's Office of Occupational Medicine performs workplace-related case evaluations and cluster investigations, including medical record reviews, employee interviews, and medical screening activities.

**Selected References**

1. Centers for Disease Control and Prevention. Investigating Suspected Cancer Clusters and Responding to Community Concerns: Guidelines from CDC and the Council of State and Territorial Epidemiologists. *Morbidity and Mortality Weekly Report* 2013;62(RR08):1-14. [PubMed Abstract]

## **Related Resources**

- Cancer Causes and Risk Factors

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