Causes of Lung Cancer

Most lung cancer is caused by cigarette smoking. Tobacco smoke contains many carcinogens—harmful substances that damage cells. Over time, these cells can become cancerous. The more a person smokes, the higher the risk of getting cancer—not just lung cancer, but also cancers of the mouth, throat, esophagus, larynx, bladder, kidney, cervix, and pancreas.

Although quitting early is best, smokers should know that it is never too late to benefit from quitting—even if they have lung cancer. Lung cancer patients who stop smoking are less likely to get a second lung cancer than are patients who continue to smoke.

Although smoking is by far the major cause of lung cancer, it is not the only cause. Exposure to other people's tobacco smoke (environmental tobacco smoke) increases the risk of lung cancer among nonsmokers. Scientists have found that nonsmokers who live or work with smokers have a higher lung cancer risk than nonsmokers who do not face this type of exposure to environmental tobacco smoke.

Exposure to certain carcinogens in the workplace, such as asbestos, also increases the risk of lung cancer. (The risk is especially high for workers who smoke.) People should carefully follow work and safety rules to reduce their exposure to workplace carcinogens.

Workers (especially smokers) who are exposed to high levels of radon, a radioactive gas, have an increased risk of developing lung cancer. High levels of radon are found in some types of underground mines (for example, underground uranium mines). Radon also can build up in some homes, but the levels in homes are generally much lower than in mines. Researchers are studying how exposure to radon in the home affects lung cancer risk. The U.S. Environmental Protection Agency can provide information about radon exposure and testing for radon in the home.

Diagnosis

To find the cause of any of these symptoms, the doctor asks about the patient's personal and family medical background as well as smoking and work history. The doctor also does a physical exam and usually orders x-rays and other tests.

In addition to chest x-rays, the doctor may order other pictures of areas inside the body. For example, a CT scan (also called a CAT scan) is a series of x-ray images put together by a computer. These detailed pictures can reveal that a tumor is in the lung, but they cannot show whether the tumor is benign or malignant.

The only sure way to know whether cancer is present is to obtain cells from the lungs so that a pathologist can examine them under a microscope. Sometimes, cancer cells can be found in the sputum, a thick fluid that the patient coughs up from deep in the airways. Also, the doctor usually does a biopsy to remove a sample of cells from the lung.

To do a biopsy, the doctor uses one of the procedures described below:

- An exam called bronchoscopy permits the doctor to look into the breathing passages through a bronchoscope (a thin, lighted tube). A local anes-

thetic reduces discomfort and gagging, and medicine helps the patient relax as the doctor inserts the tube through the nose or mouth. (A general anesthetic may be used instead to put the patient to sleep.) The doctor can brush or wash cells from the walls of bronchi or snip off small pieces of tissue for study under a microscope.

- Needle aspiration is a procedure to remove cells that are hard to reach with the bronchoscope. After the patient is given a local anesthetic, the doctor inserts a needle through the chest into the tumor to withdraw a small sample of tissue. Most often, the doctor uses fluoroscopy or CT scans to locate the tumor.
- Sometimes, examination of fluid from the pleura (the fluid-filled sac that surrounds the lungs) can reveal lung cancer. Using a needle, the doctor removes a sample of the fluid in the pleura and checks it for cancer cells. For this procedure, called thoracentesis, the patient receives a local anesthetic.
- For some patients, surgery is needed to diagnose lung cancer. Surgery to open the chest (for diagnosis or treatment) is called thoracotomy. This is major surgery and is done under a general anesthetic.

If the doctor can feel swollen lymph nodes or an enlarged liver, these areas may be biopsied to help with the diagnosis. The doctor also may biopsy other sites of the body where cancer is suspected.

The Promise of Cancer Research

Researchers at hospitals and medical centers all across the country are studying lung cancer. They are trying to learn more about what causes this disease and how to prevent it. They also are looking for better ways to detect and treat it.

Cause and Prevention

Scientists are continuing to identify factors that may increase the risk for lung cancer. Recent research has shown that genetic factors play an important role in lung cancer risk. For example, certain genetic traits make some people very sensitive to carcinogens. Smokers with these traits may be more likely than other smokers to develop lung cancer.

Researchers also are studying ways to help people lower their risk of lung cancer. An important area of study is chemoprevention—the use of natural and laboratory-made substances to prevent or delay cancer. Vitamin A and substances like it may offer some protection against lung cancer. Other substances also are being studied. However, more research is needed, and some vitamins can be dangerous if taken in large doses. It is best to get a doctor's advice before taking vitamins or other nutrients.

Currently, we know that the best way to prevent lung cancer is not to smoke. The National Cancer Institute and other organizations have programs designed to reduce the number of smokers. If these efforts are successful, far fewer people will develop and die of lung cancer each year.

Detection

The earlier cancer is detected, the more successful treatment is likely to be. However, lung cancer is difficult to diagnose at an early stage. For this reason, scientists are studying ways of checking for lung cancer in people who have no symptoms of the disease. This is called screening. The goal of screening is to detect lung cancer before symptoms appear so that it can be treated as early as possible. Whether successful screening methods for this disease can be developed is not yet known.

Each year, more than 170,000 people in the United States learn that they have lung cancer.

Types of Lung Cancer

Nearly all lung cancers are carcinomas. A carcinoma is a cancer that begins in the lining or covering tissues of an organ. Lung cancers are generally divided into two types: nonsmall cell lung cancer and small cell lung cancer. The tumor cells of each type of lung cancer grow and spread differently, and each type needs different treatment.

Nonsmall cell lung cancer is more common than small cell lung cancer. The three main kinds of nonsmall cell lung cancer are named for the type of cells in the tumor.

- **Squamous cell carcinoma**, also called epidermoid carcinoma, is the most common type of lung cancer in men. This disease often begins in the bronchi. It usually does not spread as quickly as other types of lung cancer.
- **Adenocarcinoma** usually begins along the outer edges of the lungs and under the lining of the bronchi. This is the most common type of lung cancer in women and in people who have never smoked.
- **Large cell carcinomas** are a group of cancers with large, abnormal-looking cells. These tumors usually begin along the outer edges of the lungs.

Small cell lung cancer is sometimes called oat cell cancer because the cancer cells may look like oats when viewed under a microscope. This type of lung cancer grows rapidly and quickly spreads to other organs.

Symptoms

Lung cancer usually does not cause symptoms when it first develops. Doctors sometimes discover lung cancer in a person with no symptoms after the individual has a chest x-ray for another medical reason. Usually, however, lung cancer is found after the growing tumor causes symptoms to appear.

A cough is the most common symptom of lung cancer. It is likely to occur when a tumor irritates the lining of the airways or blocks the passage of air. The person may have a "smoker's cough" that becomes worse. Another symptom is constant chest pain. Other symptoms may include shortness of breath, wheezing, repeated bouts of pneumonia or bronchitis, coughing up blood, or hoarseness. A tumor that presses on large blood vessels near the lung can cause swelling of the neck and face. If the tumor presses on certain nerves near the lung, it can cause pain and weakness in the shoulder, arm, or hand.

In addition, there may be symptoms that do not seem to be at all related to the lungs. Like all cancers, lung cancer can cause fatigue, loss of appetite, and loss of weight. If the cancer spreads to other parts of the body, it may cause headache, pain, or bone fractures.

Other symptoms can be caused by substances made by lung cancer cells. Doctors often refer to these symptoms as a paraneoplastic syndrome. For example, certain lung cancer cells produce a substance that causes a sharp drop in the level of salt (sodium) in the blood. A decrease in the sodium level can cause many symptoms, including confusion and sometimes even coma. None of these symptoms is a sure sign of lung cancer. Only a doctor can tell whether a patient's symptoms are caused by cancer or by another problem.