Lung Cancer - small cell

Overview

Lung cancer is a cancer starts in the lungs. In order to understand lung cancer, it helps to know about the normal structure and function of the lungs.

Most lung cancer starts in the lining of the bronchi, but it can also start in other parts of the lung. Lung cancer often takes many years to develop. First, there may be pre-cancerous changes in the lung. These changes are not a mass or tumor. They can't be seen on an x-ray and they don't cause symptoms.

Over time, these pre-cancerous areas may go on to become true cancer and make chemicals that cause new blood vessels to form nearby. These new blood vessels nourish the cancer cells and allow a tumor to form. Finally, the tumor becomes large enough to show up on an x-ray.

At some point, lung cancer cells can break away and spread to other parts of the body in a process called metastasis. Lung cancer is a life-threatening disease because it often spreads this way before it is found.

One of the ways lung cancer can spread is through the lymphatic system. Lymphatic vessels are like veins but carry lymph instead of blood. Lymph is a clear fluid that contains tissue waste products and immune system cells. Lung cancer cells can enter lymphatic vessels and begin to grow in lymph nodes around the bronchi and in the area between the lungs. When lung cancer cells have reached the lymph

nodes, they are more likely to have spread to other organs of the body too. Staging and decisions about lung cancer treatment are based on whether or not the cancer has spread to the nearby lymph nodes.

Causes

A risk factor is anything that affects a person's chance of getting a disease, such as cancer. Different cancers have different risk factors. Some risk factors, such as smoking, can be controlled. Others, like a person's age or family history, can't be changed.

Many factors can increase the risk of lung cancer. But risk factors don't tell us everything. Having a risk factor, or even several risk factors, does not mean that you will get the disease. And many people who get the disease may not have had any known risk factors. Even if a person with lung cancer has a risk factor, it is often very hard to know how much that risk factor may have contributed to the cancer.

Still, having many risk factors can make you more likely to develop lung cancer.

Tobacco Smoke

Smoking is by far the leading risk factor for lung cancer. Tobacco smoke causes more than nearly 9 out of 10 cases of lung cancer. The longer a person has been smoking and the more packs per day smoked, the greater the risk. If a person stops smoking before lung cancer

develops, the lung tissue slowly returns to normal. Stopping smoking at any age lowers the risk of lung cancer.

Cigar and pipe smoking are almost as likely to cause lung cancer as is cigarette smoking. There is no evidence that smoking low tar or "light" cigarettes is safer than smoking regular cigarettes or reduces the risk of lung cancer.

People who don’t smoke but who breathe the smoke of others may also be at a higher risk for lung cancer. Non-smoking spouses who live with a smoker, for example, have about a 20% to 30% greater risk of developing lung cancer than do spouses of non-smokers. Non-smokers exposed to tobacco smoke in the workplace are also more likely to get lung cancer.

Hookah smoking has become popular among young people in recent years. It is often marketed as being safer than cigarettes. Although there is less tobacco in the product used for hookahs, it is still dangerous and addictive. And hookah smoking may lead to cigarette smoking in the future.

Radon

Radon is a radioactive gas made by the natural breakdown of uranium, which is found at higher than normal levels in the soil in some parts of the United States. Radon can't be seen, tasted, or smelled. It can become concentrated indoors and create a possible risk for cancer. Smokers are especially sensitive to the effects of radon. State and local offices of the EPA (Environmental Protection Agency) can give you information on how to test for radon in the home.

Asbestos

Asbestos exposure is another risk factor for lung cancer. People who work with asbestos have a higher risk of getting lung cancer. If they smoke too, the risk is greatly increased. Both smokers and non-smokers exposed to asbestos also have a greater risk of developing a type of cancer (called mesothelioma) that starts in the lining of the lungs. Although asbestos was used for many years, the government has now nearly stopped its use in the workplace and in home products. While it is still present in many buildings, it is not thought to be harmful as long as it is not released into the air.

Other Cancer-causing Agents in the Workplace

Other things that cause cancer (cancer-causing agents) found in the workplace that can increase lung cancer risk include:

- radioactive ores such as uranium
- inhaled chemicals or minerals such as arsenic, beryllium, cadmium, vinyl chloride, nickel compounds, chromium compounds, coal products, mustard gas, and chloromethyl ethers
- diesel exhaust

The government and industry have taken major steps in recent years to protect workers. But the dangers are still there, and if you work around any of these, you should be very careful to avoid exposure.

Radiation Treatment to the Lungs

People who have had radiation to the chest to treat another cancer are at higher risk for lung cancer, especially if they smoke. Non-smoking women who have radiation to the breast after a lumpectomy for breast cancer do not have a higher risk of lung cancer unless they also smoke.

Arsenic

High levels of arsenic in drinking water may increase the risk of lung cancer. The effect is even greater for smokers.

Certain Diseases

Diseases such as silicosis and berylliosis (caused by breathing in certain minerals) also increase the risk of lung cancer.

Personal and Family History

If you have had lung cancer, you have a higher risk of getting another lung cancer. Brothers, sisters, and children of people who have had lung cancer may have a slightly higher risk themselves. Research is being done on this.

Diet and Vitamins

Some reports suggest that a diet low in fruits and vegetables might increase the risk of lung cancer in people who are exposed to tobacco smoke. It may turn out that fruits and vegetables help protect against lung cancer. On the other hand, two studies have found that smokers who took beta carotene supplements actually had an increased risk of lung cancer. The results of these studies suggest that smokers should avoid taking beta carotene supplements.

Air Pollution

In cities, air pollution may slightly increase the risk of lung cancer. But the risk is still far less than that caused by smoking.

Marijuana

Medical reports suggest that marijuana could cause cancers of the mouth and throat. But because marijuana is an illegal substance it is not easy to gather information about its effects on the body. Marijuana cigarettes have more tar than regular cigarettes. Many of the cancer-causing substances in tobacco are also found in marijuana. Marijuana is also inhaled very deeply and the smoke is held in the lungs for a long time. For these reasons it is thought that smoking marijuana may increase lung cancer risk.

DNA and Gene Changes

During the past few years, scientists have made great progress in understanding how risk factors produce certain changes in the DNA of lung cells, causing the cells to become cancerous. DNA is the genetic material that carries the instructions for nearly everything our cells do.

Current research in this field is aimed at developing tests that can find lung cancers at an early stage by spotting DNA changes. But these tests are not yet ready for routine use. Therefore, doctors stress the importance of avoiding tobacco smoke and the other risk factors listed above.

Symptoms and Diagnosis

Since most people with early lung cancer do not have any symptoms, only a small number of lung cancers are found at an early stage. When lung cancer is found early, it is often because of tests that were being done for something else.

Screening Tests for Lung Cancer

Screening is the use of tests or exams to find a disease (such as cancer) in people who don't have any symptoms. Because lung cancer often spreads beyond the lungs before it causes symptoms, a good screening test to find lung cancer early could save many lives.

Chest x-rays and checking sputum (spit) under a microscope to look for cancer cells have been studied for many years. These studies have shown that this kind of screening does not find many lung cancers early enough to improve a person's chance for a cure. For this reason, lung cancer screening is not usually advised even for people at higher risk, such as those who smoke.

Recently a new x-ray method called spiral CT scanning has shown some promise in finding early lung cancer in smokers and former smokers. But it has not yet known if this test will lower the chances of dying from lung cancer. One major problem is that it finds a lot of things that turn out not to be cancer. This leads to unnecessary tests and even surgery.

To find out how useful this test might be, a large study is going on. It is called the National Lung Screening Trial (NLST). When the results come out, we will have a better idea whether spiral CT scanning will catch lung cancer early enough to save lives.

Until then, people who smoke, who smoked in the past, or who have been exposed to secondhand smoke, as well as those who have worked around materials that increase the risk for lung cancer need to be aware of their lung cancer risk. They should talk to their doctors about their chances of getting lung cancer and the pros and cons of lung cancer screening.

If, after talking all of this over with your doctor, you decide in favor of

testing, be sure to choose a place that has experience in lung screening with a good program to evaluate people at high risk.

People who smoke should keep in mind that the best way to avoid dying from lung cancer is to stop smoking.

Common Signs and Symptoms of Lung Cancer

Although most lung cancers do not cause symptoms until they have spread, you should report any of the following problems to your doctor right away:

- a cough that does not go away
- chest pain, often made worse by deep breathing, coughing, or laughing
- hoarseness
- weight loss and loss of appetite
- bloody or rust-colored sputum (spit or phlegm)
- shortness of breath
- infections such as bronchitis and pneumonia that keep coming back
- new onset of wheezing

Often these problems are caused by something other than cancer. But if lung cancer is found, getting treatment right away could help you live longer and relieve symptoms.
When lung cancer spreads to distant organs, it may cause:

- bone pain
- weakness or numbness of the arms or legs
- headache, dizziness, or seizure
- yellow coloring of the skin and eyes (jaundice)
- lumps near the surface of the body, caused by cancer spreading to the skin or to lymph nodes in the neck or above the collarbone

If you have any of these symptoms, you should see a doctor right away.

Less often, there are some other clusters of symptoms (called syndromes) that can point to a possible lung cancer.

If Lung Cancer Is Suspected

After asking questions about your health and doing a physical exam, your doctor might want to do some of the following:

Imaging Tests

There are a number of different tests that can produce pictures of the inside of your body. Some of these are used to find lung cancer, to see if it has spread, or to find out whether treatment is working.

Chest x-ray: This is the first test your doctor will do in order to look for any spots on the lungs. It is a plain x-ray of your chest. If the x-ray is normal, you most likely do not have lung cancer. If anything does not look normal, the doctor may order more tests.

CT scan (Computed Tomography; tuh-mah-gruh-fee): A CT scan is a special kind of x-ray. Instead of taking just one picture, the CT scanner takes many pictures as it moves around you. A computer then combines these pictures into an image of a slice of your body. Often after the first set of pictures is taken you will get an injection of a contrast "dye" that helps to outline structures in your body. Then a second set of pictures is taken. The dye may cause some flushing (a feeling of warmth, especially in the face). Some people are allergic and get hives. Rarely, more serious reactions like trouble breathing or low blood pressure can happen. Be sure to tell the doctor if you have ever had a reaction to any contrast material used for x-rays. CT scans take longer than normal x-rays, but they are getting faster all the time.

The CT scan will give the doctor exact information about the size, shape, and place of a tumor. It can also help find swollen lymph nodes that might contain cancer. CT scans are also used to find tumors in other organs that might be the spread of lung cancer.

MRI scan (Magnetic Resonance Imaging): MRI scans use radio waves and strong magnets instead of x-rays to take pictures of your insides. MRI scans take longer than x-rays—often up to an hour. Also, you have to be placed inside a tube-like machine, which upsets some people. Newer, "open" MRI machines can sometimes help with this if needed. MRI scans are useful in finding lung cancer that has spread to the brain or spinal cord.

PET scan (Positron Emission Tomography): PET uses a form of sugar that contains a radioactive atom. Cancer cells in the body absorb large amounts of the sugar. A special camera can then detect the radioactivity. This test can show whether the cancer has spread to the lymph nodes. It is also helpful in telling whether a spot on your chest x-ray is cancer. PET scans are also useful when the doctor thinks the cancer has spread, but doesn't know where. Newer machines combine a CT and a PET scan to even better pinpoint tumors.

Bone scan: For a bone scan a small amount of radioactive substance is injected into a vein. The amount used is very low and it causes no long-term effects. This substance builds up in areas of bone that may be abnormal because of cancer. These will be seen on the bone scan image as dense, gray to black areas, called "hot spots." While this may suggest the presence of metastatic cancer, other problems can also cause suspicious results. Bone scans are only done in patients with lung cancer when other test results or symptoms suggest that the cancer has spread to the bones.

Tests of Tissues and Cells

The following tests can be used to be sure that something seen on an imaging test is really lung cancer. These tests are also used to decide the exact type of lung cancer and how far it may have spread.

A doctor who is an expert in using lab tests to diagnose diseases such as cancer (called a pathologist) will look at the cells under a microscope. If you have any questions about your pathology results or any other tests, be sure and ask your doctor. If needed, you can get a

second opinion of your pathology report (called a pathology review) by having your tissue sample sent to a pathologist at another lab that your doctor may recommend.

Sputum Cytology (sigh-tahl-uh-jee)

A sample of mucus you cough up from the lungs (phlegm: pronounced "flem") is looked at under a microscope to see if cancer cells are present.

Fine Needle Biopsy (FNA)

A long, thin (fine) needle is placed into the tumor in the lung to remove a sample of cells. The tissue cells are looked at in the lab to see if cancer cells are present.

Bronchoscopy (bron-kos-kuh-pee)

A lighted, flexible tube (called a bronchoscope) is passed through the mouth into the bronchi. This test can help find tumors, or it can be used to take samples of tissue or fluids to see if cancer cells are present. You may be given drugs to make you sleep for this exam.

Endobronchial Ultrasound (en-do-brong-e-uhl ultrasound)

Ultrasound is a test that uses sound waves to make pictures of parts of your body. For endobronchial ultrasound, a bronchoscope is fitted with an ultrasound device at its tip and is passed down into the windpipe. If areas of concern (such as enlarged lymph nodes) are seen on the ultrasound, a hollow needle can be passed through the bronchoscope and guided by ultrasound into the area to take biopsy samples. The samples are then looked at under a microscope to see if cancer cells are present.

Endoscopic Esophageal Ultrasound (EUS) (en-do-skah pik uh-sof-uh-jee-uhl ultrasound)

This test is much like an endobronchial ultrasound, except an endoscope (a lighted, flexible scope) is used. It is passed down the throat and into the esophagus (the swallowing tube that connects the throat to the stomach). The essophagus lies just behind the windpipe. This test is done with numbing medicine (local anesthesia) and light sedation.

Ultrasound images taken from inside the esophagus can help find large lymph nodes inside the chest that might contain lung cancer. If areas of concern (such as enlarged lymph nodes) are seen on the ultrasound, a hollow needle can be passed through the endoscope to get biopsy samples of them. The samples are then looked at under a microscope to see if they contain cancer cells.

Mediastinoscopy (me-dee-uh-stine-AHS-kuh-pee) and Mediastinotomy (me-dee-uh-stine-AHT-uh-me)

Both of these tests allow the doctor to look at and sample the structures in the area between the lungs (mediastinum) and behind the breast bone. They are done in an operating room while you are in a deep sleep (under general anesthesia). The main difference between the two is in the place and size of the incision.

Thoracentesis (thor-uh-sen-tee-sis) and Thoracoscopy (thor-uh-kos-kuh-pee)

These tests are done to check whether fluid around the lungs is caused by cancer or by some other medical problem, such as heart failure or an infection. For thoracentesis, the skin is numbed and a needle is placed between the ribs to drain the fluid. The fluid is checked for cancer cells. Thoracoscopy uses a thin, lighted tube connected to a video camera and screen to look at the space between the lungs and the chest wall. By doing this, the doctor can see any cancer deposits on the lung or lining of the chest wall and take out small pieces of tissue to be looked at under the microscope. Thoracoscopy can also be used to sample lymph nodes and fluid.

Bone Marrow Biopsy

After the area is numbed, a needle is used to remove a small piece of bone, usually from the back of the hip bone. The sample is checked for cancer cells. This is done mostly to help find if small cell lung cancer has spread to the bones.

Other Tests

Blood Tests

Blood tests are not used to find lung cancer, but they are done to get a sense of a person's overall health. A complete blood count (CBC) shows whether your blood has the correct number of different cell types. This test will be done often if you are treated with chemotherapy because these drugs can affect the blood-forming cells of the bone marrow. Other blood tests can spot problems in different organs, such as the kidneys, liver, and bones.

Pulmonary Function Tests

Pulmonary function tests (PFTs) are often done after a lung cancer has been found. These tests show how well your lungs are working. This is especially important if surgery might be an option in treating the cancer. These tests can give the surgeon an idea of how much lung can be removed or whether surgery is a good option at all.

Treatment

How is small cell lung cancer treated?
This information represents the views of the doctors and nurses serving on the American Cancer Society's Cancer Information Database Editorial Board. These views are based on their interpretation of studies published in medical journals, as well as their own professional experience.

The treatment information in this document is not official policy of the Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor.

Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.

Making Treatment Decisions

If you have small cell lung cancer, the main treatment will most likely be chemotherapy, either alone or combined with radiation. Very rarely, surgery might be done, depending on the stage of the cancer.

After the cancer is found and staged, your doctor will talk to you about treatment choices. Give yourself time to take in the information you have learned. The most important things to think about include the stage and type of cancer, your overall health, the likely side effects of the treatment, and the chance of curing the cancer or helping you live longer. Age alone should not keep you from having treatment. Older people can benefit from treatment as much as younger people as long as their general health is good.

It is often a good idea to get a second opinion. A second opinion can provide more information and help you feel good about the treatment plan you choose. Your doctor should not mind your doing this. If your first doctor has done tests, the results can be sent to the second doctor so that you will not have to have them done again.

Types of Treatment for Small Cell Lung Cancer

Surgery

Surgery is rarely used in small cell lung cancer. In about 1 out of 20 cases, the small cell lung cancer is in only one tumor nodule, with no spread to lymph nodes or other organs. In these cases, surgery might be helpful and it is usually followed by further treatment with chemotherapy or radiation. Several different operations can be used to treat small cell lung cancer:

- pneumonectomy (**new**-mo-**NECK**-tuh-me): the entire lung is removed in this surgery.
- lobectomy (low-**bek**-tuh-me): a section (lobe) of the lung is removed in this surgery.
- segmentectomy or wedge resection: part of a lobe is removed in this surgery.

As a rule, lobectomy is the preferred operation for small cell lung cancers treated with surgery. With any of these operations, lymph nodes are also removed to look for possible spread of the cancer. These operations are done with the patient asleep (under general

anesthesia). A hospital stay of 1 or 2 weeks is usually needed. There will be some pain after the surgery because the surgeon has to cut through the ribs to get to the lungs. Other possible problems include bleeding, wound infections, and pneumonia.

There is a new kind of surgery for people with early stage lung cancer. It is called video-assisted chest surgery (VATS). A tiny camera can be placed through a small hole in the chest to help the surgeon see the tumor. One or two other small holes are made in the skin, and long instruments passed though these holes are used to remove the tumor. Only small incisions are needed, so there is less pain after surgery. This approach is most often used for tumors smaller than about 2 inches. The cure rate seems to be the same as for standard surgery. The doctor who does this surgery should have experience because it requires a lot of skill.
People whose lungs are in good condition (other than the cancer) can often return to normal activities after a lobe or even an entire lung is removed. But if they also have problems such as emphysema or chronic bronchitis (common in heavy smokers), they may have long-term shortness of breath.

For people who can't have the usual surgery because of lung disease, other medical problems, or because the cancer is widespread, other types of surgery (for example, laser surgery) can be done to relieve symptoms.
Sometimes fluid collects in the chest and interferes with breathing. This fluid can be removed through a small tube placed in the chest. After the fluid is drained out either talc or some type of drug is placed into the chest. This will start a reaction that will help seal the space and prevent future fluid build-up.

Radiation Therapy

Radiation therapy is treatment with high-energy rays (such as x-rays) to kill or shrink cancer cells. The radiation comes from outside the body (external radiation). In small cell lung cancer it is most often used along with chemotherapy (in limited stage disease) to treat the tumor and lymph nodes in the chest.

Radiation might be used after surgery to kill small areas of cancer that can't be seen and removed during surgery. Or it could be used on the brain to try to prevent the spread of cancer there. Radiation can also be used to relieve symptoms such as pain, bleeding, trouble swallowing, or problems caused by the cancer spreading to the brain. It is usually given in small daily doses over many weeks.
Standard radiation is used less often than in the past. Newer methods allow doctors to be more accurate in treating lung cancers while reducing radiation to nearby healthy tissues.

Possible Side Effects

Side effects of radiation could include mild skin problems, nausea, vomiting, and tiredness. Often these go away after a short while. Chest radiation may cause lung damage and trouble breathing or swallowing.

Side effects of radiation therapy to the brain usually become most serious 1 or 2 years after treatment. These side effects could include memory loss, headaches, trouble with thinking, and less sexual desire. These side effects, though, are minor compared to those caused by lung cancer tumors that have spread to the brain.

Chemotherapy

Chemotherapy (often called simply "chemo") is treatment with anticancer drugs given into a vein or taken by mouth. These drugs

enter the bloodstream and go throughout the body, making this treatment useful for cancer that has spread (metastasized) to organs beyond the lung. Doctors give chemo in cycles, with each period of treatment followed by a rest period to allow the body time to recover. Chemo cycles generally last about 3 to 4 weeks, and the first round of treatments is most often 4 to 6 cycles.
Chemotherapy is usually the main treatment for small cell lung cancer. Many drugs may be given at the same time.

Possible Side Effects

Chemotherapy drugs kill cancer cells but they also damage some normal cells, causing side effects. These side effects depend on the type of drugs used, the amount given, and the length of treatment. You could have some of these short-term side effects:

- hair loss
- mouth sores
- loss of appetite
- nausea and vomiting
- increased chance of infections (due to low white blood cell counts)
- easy bruising or bleeding (due to low blood platelet counts)
- feeling very tired all the time, called fatigue (due to low red blood cell counts)

Some chemotherapy drugs can damage nerves. This can cause numbness in the fingers and toes, and sometimes the arms and legs may feel weak. You should report this, as well as any other side effects or changes you notice while getting chemo so that they can be treated right away.

Most of these side effects go away when treatment is over. Be sure to tell your doctor or nurse if you have any side effects, as there are often ways to help.

Small Cell Lung Cancer Survival by Stage

It is hard to get accurate survival rates for small cell lung cancer because doctors don't all agree on just what makes up limited stage or

extensive stage disease. And in some cases, a person's disease may have spread more than it appears at first.

If small cell lung cancer is found very early and seems to only be in the lung, the relative 5-year survival rate is around 20%. But very few patients fall into this group.

If cancer has spread to nearby lymph nodes but is still thought to be limited stage disease, the relative 5-year survival is around 10% to 15%. About 1 out of 3 small cell lung cancers are in this group.

About 2 out of 3 small cell lung cancers are already at an extensive stage when they are found. The relative 5-year survival for extensive stage disease is about 2%.

Five-year relative survival rates means that people who die of other causes are not included, and the rate only includes people who die from lung cancer.

While these numbers provide an overall picture, keep in mind that every person's situation is unique and the statistics can't predict exactly what will happen in your case. Talk with your cancer care team if you have questions about your own chances of a cure, or how long you might survive your cancer. They know your situation best.

Information was obtained from the American Cancer Society. For more detailed information, visit their website at www.cancer.org/docroot/home/index.asp.