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# Lung Cancer Treatment Update

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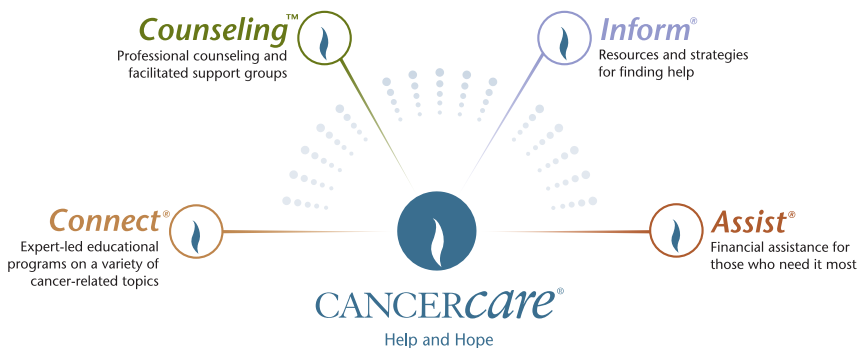
- Lung cancer basics
- Diagnostic tools
- Treatment options
- Your support team



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### Contacting CancerCare

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Website: [www.cancercares.org](http://www.cancercares.org)

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# New targeted treatments are benefiting people with lung cancer.

In 2007, more than 213,000 Americans will be diagnosed with lung cancer—the number one cause of cancer death in the United States among both men and women. Nearly twice as many women die of lung cancer than of breast cancer.

About 85 percent of people who develop lung cancer either are or have been smokers. Yet some people who have never smoked still get the disease. Scientists are not sure why this is. It could be due to secondhand smoke, a gas called radon that occurs naturally, or other cancer-causing substances.

Because the lungs are large, **tumors** can grow in them for a long time before they are found. In fact, lung cancer can easily spread outside the lungs without causing any symptoms. The more common symptoms are cough and fatigue. Many people who have these symptoms often assume they are due to smoking itself or to a minor illness, such as a cold.

## Types of Lung Cancer

Doctors determine the type of lung cancer by looking at a **biopsy** of tumor cells under the microscope. It's important to know the specific type because it helps doctors recommend the best treatment. There are two major types of lung cancer:

**Non-small cell lung cancer** accounts for about 85 percent of lung cancers. Among them are these types of tumors:

- **Adenocarcinoma** is the most common form of lung cancer in the United States among both men and women.
- **Bronchioalveolar carcinoma**, or BAC, is a less common

type of adenocarcinoma. It forms near the lungs' air sacs.

- **Epidermoid carcinoma** (also called squamous cell carcinoma) forms in the lining of the **bronchial tubes**.
- **Large cell carcinomas** This name refers to non-small cell lung cancers that are neither adenocarcinomas nor epidermoid cancers.

**Small cell lung cancer** accounts for about 15 percent of lung cancers in the United States. As a rule, small cell lung cancer has spread—at least in tiny amounts—by the time doctors find it.

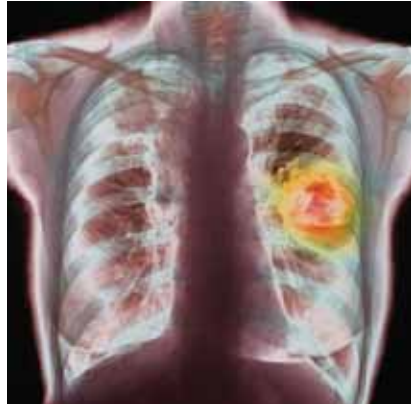
## Diagnostic Tools

Unlike mammography for breast cancer or colonoscopy for colon cancer, there is no widely accepted screening tool for early-stage lung cancer. Unfortunately, regular chest x-rays are not reliable enough to find lung tumors in their earliest stages, when many doctors believe the tumors are at their smallest and most curable.

Recent studies have suggested that another technique can detect tumors as small as 5 millimeters—less than a ¼ inch. Called **helical (or spiral) computed tomography** (or **CT**

**scanning**), this technique is being tested in several studies around the world to see if it can find lung cancer early enough to improve survival.

However, even though CT scanning finds more tumors, which leads to more treatment, some experts are skeptical that this will lead to fewer cases of advanced lung cancer or fewer



*Colored chest x-ray showing a tumor (orange, yellow) in the left lung*

deaths from lung cancer. This was the conclusion of a recent study conducted in the United States and Italy. The study was launched to test the concept that finding lung tumors when they are at their smallest will be of benefit. But the researchers found that this sort of test for lung cancer might not make a difference in terms of survival. They said more data are needed to determine whether or not spiral CT scanning should be widely used to screen for lung cancer in people who have no symptoms.

Until more information is available, they recommend that people without symptoms be screened with CT in a clinical trial to carry on the research. Only then can the benefits—or risks—of this technique be fully understood. For more information on clinical trials, see page 10 and our resource list on page 20.

When lung cancer is suspected, a small piece of tissue from the lung must be examined under a microscope to look for cancer cells. Called a biopsy, this procedure can be performed in different ways. In some cases, the doctor passes a needle through the skin into the lung to remove a small piece of tissue; this procedure is often called a “needle biopsy.” In other cases, a biopsy may be done during a bronchoscopy. For this procedure, the doctor threads a small tube through the mouth or nose and into the lungs. The tube, which has a light on the end, allows the doctor to see inside the lungs and to remove a small tissue sample.



These procedures can be performed without a hospital stay. Occasionally, a small operation, requiring anesthesia, is needed.

## Stages of Lung Cancer

When lung cancer is diagnosed, it's important to know what stage it is. The stage helps determine treatment, taking into account the size of the tumor and whether the cancer has spread from the lungs to the **lymph nodes** or other organs. Lymph nodes are small, bean-shaped structures that act as filtering stations to remove waste and fluids and to help fight infection. When cancer cells spread to the lymph nodes, they can travel throughout the body and form tumors far from their original site.

Because early-stage lung cancer (stages I and II) is so difficult to detect, most people are diagnosed at stages III and IV.

The stages for the two major types of lung cancer are different.

### NON-SMALL CELL LUNG CANCER

The four stages of non-small cell lung cancer are:

**Stage I** The cancer is located only in the lungs and has not spread to any lymph nodes. This is the least advanced stage.

**Stage II** The cancer is in the lung and nearby lymph nodes.

**Stage III** Cancer is found in the lung and in the lymph nodes in the middle of the chest, or there is a tumor in the lung plus fluid in the chest cavity. Stage III cancer has two subtypes:

- If the cancer has spread only to the lymph nodes on the same side of the chest as where the cancer started, it is called stage III-A.
- If the cancer has spread to the lymph nodes on the opposite side of the chest or caused fluid to form in the chest, it is called stage III-B.

**Stage IV** Stage IV is the most advanced stage of lung cancer. This is when the cancer has spread to another part of the body, such as the liver or other organs.

## SMALL CELL LUNG CANCER

Small cell lung cancer is divided into two stages:

- **Limited stage** In this form, cancer is found on one side of the chest, involving just one part of the lung and nearby lymph nodes.
- **Extensive stage** Here, cancer has spread to other regions of the chest or other parts of the body.

## Treatment Options

Surgery, radiation, chemotherapy, and **targeted treatments**—alone or in combination—are used to treat lung cancer.

### SURGERY

Most stage I and stage II non-small cell lung cancers are treated with surgery to remove the tumor. For this procedure, called a **lobectomy**, a surgeon removes the lobe, or section, of the

lung containing the tumor.



Some surgeons use video-assisted thoracoscopic surgery (VATS). For this procedure, the surgeon makes a small incision, or cut, in the chest and inserts a tiny camera attached to a tube called a thoracoscope. The camera is connected to a video monitor that allows the surgeon to see inside the chest. A lung lobe can

then be removed through the scope, without making a large incision in the chest.

### CHEMOTHERAPY AND RADIATION

For people with non-small cell lung tumors that can be surgically removed, evidence suggests that chemotherapy after surgery, known as **adjuvant chemotherapy**, will help

prevent the cancer from returning. Still, questions remain about whether adjuvant chemotherapy is best for all patients and how much people with different stages of lung cancer will benefit. Research continues on this much-debated topic.

For people with stage III lung cancer, doctors may recommend a combination of anti-cancer drugs, possibly followed by radiation treatments to shrink the tumor, or surgery to remove what remains of the tumor.

In stage IV lung cancer, chemotherapy is typically the main treatment. It is often combined with radiation.

The chemotherapy treatment plan for lung cancer often consists of a combination of drugs. Among the drugs most commonly used are:

- *Either* cisplatin (available under the trade name Platinol as well as generically) *or* carboplatin (Paraplatin or generic carboplatin)
- *Plus* docetaxel (Taxotere), gemcitabine (Gemzar), paclitaxel (Taxol and others), *or* vinorelbine (Navelbine and others).



There are times when these treatments may not work. Or, after these drugs work for a while, the lung cancer may come back. In such cases, doctors often prescribe a second course of drug treatment referred to as **second-line chemotherapy**. For example, docetaxel is often used for second-line treatment if it was not used in the first treatment plan. A new drug called pemetrexed (Alimta) may also be used for second-line treatment of lung cancer.

For people with small cell lung cancer, chemotherapy, rather than surgery, is usually the treatment of choice right from the start. Radiation treatment is used as well.

## CHEMOTHERAPY BEFORE OTHER TREATMENTS

There are a number of reasons to believe that receiving chemotherapy *before* radiation or surgery may also help people with lung cancer. Chemotherapy may:

- shrink the tumor enough to make it easier to remove with surgery;
- increase the effectiveness of radiation;
- destroy hidden cancer cells at the earliest possible time.

Also, research shows that people with lung cancer are much more able to cope with the side effects of chemotherapy when it is given before surgery. And if a tumor doesn't shrink with chemotherapy, the medication can be stopped right away, allowing the doctor to try a different treatment.

Another reason a drug may be given before surgery is to see if it will be beneficial *after* surgery. Sometimes, a short trial period of treatment with the drug shrinks the tumor before surgery. If that is the case, then prolonged treatment with the same drug after surgery is more likely to benefit the patient.

Because many lung cancer specialists around the world are giving chemotherapy to their patients before surgery, it is something well worth discussing with your doctor.

## TARGETED TREATMENTS

One of the most exciting developments in lung cancer medicine is the introduction of targeted treatments. Rather than killing both healthy cells and cancer cells, as chemotherapy does, targeted treatments attack cancer cells primarily.

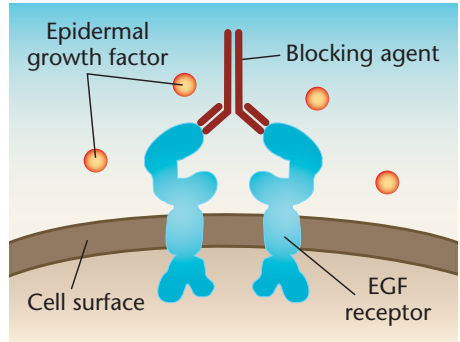
Some targeted treatments zero in on the mechanisms that help cancer cells grow and multiply. Others can disrupt tumors' blood supply to slow their growth. This spares healthy tissues and tends to cause different, less severe side effects than chemotherapy.

### *Blocking a Tumor's Growth*

A targeted treatment called erlotinib (Tarceva) has been shown to benefit some people with non-small cell lung cancer. The drug blocks a substance called **epidermal growth factor (EGF)** from encouraging a cancer cell to grow and spread.

EGF enters cells through EGF receptors on the cells' surface. Although many normal cells contain EGF receptors, some kinds of cancer cells contain excess amounts of them. The

more receptors on a cell, the more signals the cell receives to grow and multiply. In lung tumors with many EGF receptors, treatment with erlotinib can sometimes slow or block the cancer's growth.

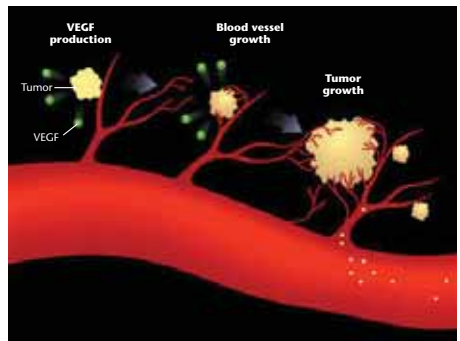


### *Blocking a Tumor's Blood Supply*

Just like normal tissues, tumors need a blood supply to survive. Blood vessels grow in several ways. One way is through the presence of another substance called **vascular endothelial growth factor (VEGF)**.

This substance stimulates blood vessels to penetrate tumors and supply oxygen, minerals, and other nutrients to feed the tumor. When tumors spread throughout the body, they release VEGF to create new blood vessels.

Bevacizumab (Avastin) works by stopping VEGF from stimulating the growth of new blood vessels. (Because normal tissues have an established blood



# The Importance of Clinical Trials

There's no question that clinical trials have led to advances in cancer treatment, creating a brighter future for people with cancer. Clinical trials are the way researchers test the worth of new treatments and study patients' quality of life as they go through those treatments. For this reason, doctors and scientists urge patients to take part in clinical trials.

Your doctor can guide you in making a decision about joining a clinical trial. Here are a few things you should know:

- Often, patients who take part in clinical trials gain access to and benefit from new treatments when standard treatments have not worked.
- Before you participate in a trial, you will be fully informed as to the risks and benefits of the trial.
- No patient receives a placebo or "sugar pill" if there is a standard treatment available for the cancer. Most trials are designed to test a new treatment against a standard treatment to find out whether the new treatment has any added benefit.
- You can stop taking part in a clinical trial at any time for any reason.

supply, they are not affected by the drug.) When combined with chemotherapy, bevacizumab has been shown to improve survival in people with certain types of non-small lung cancer such as adenocarcinoma and large cell carcinoma. The Food and Drug Administration has now approved the use of bevacizumab in this way.

## **ON THE HORIZON: 'PERSONALIZED' TREATMENTS**

Recently, scientists have identified certain genetic markers in cancer cells that can help predict whether particular treatments will be effective. And new technologies are being developed

that allow doctors to check for these genetic markers in individual patients' tumors. It is hoped that in the future, this information will be available to doctors and patients as they make treatment decisions.

If a tumor sample taken from a patient contains a high amount of EGF, for example, doctors can be more confident that that person's cancer will respond to erlotinib (which blocks EGF). The presence of certain genes can also help identify tumors that will resist a particular drug treatment. For example, when an abnormal form of the gene called *KRAS* is present in a lung tumor, the tumor will probably not shrink in response to erlotinib. Researchers are also studying other abnormal genes often found in lung tumors. The gene called *HER2* is one example. Researchers want to find out whether *HER2*—in its abnormal, or mutated, form—can be used to identify tumors that targeted treatments can treat effectively.

Research is continuing in this promising area of “personalized” medicine.

## Your Support Team

When you are diagnosed with lung cancer, you're faced with a series of choices that will have a major effect on your life, and maybe you're not sure where to turn. But help is available. Of course, your most important resources are your health care team, family members, and friends. You can also turn to these resources:

### **Nurse practitioners and physician assistants**

These professionals can teach you about your illness and treatment. They also help watch for and manage the potential side effects of treatment.



**Oncology social workers** are specially trained to help you find out more about your treatment options, learn how to find your way around the health care system, and get the best care possible. They can counsel you on how to cope with the psychological and financial demands of your illness. Often, when you are facing lung cancer, you need someone to talk with who can help you and your family sort through the complex emotions and issues that arise. For example, some lifelong smokers might blame themselves or feel that others blame them for their illness. People who have never smoked or who may have stopped years ago can be shocked and angry to learn they have lung cancer. A social worker can help you talk through your feelings so you can focus on getting well. CancerCare® offers free counseling from professional oncology social workers on staff.

**Support groups** Support groups, often led by oncology social workers, can help by providing education, companionship, coping skills, and personal empowerment.



These groups provide reassurance, suggestions, and insight—a safe haven where you can share similar concerns with your peers in a supportive environment. Support groups can reduce the feeling that you are going through cancer alone.

At CancerCare, people with cancer and their families can take part in support groups in person, online, or on the telephone.

**Financial help** is offered by a number of organizations, including CancerCare, which provides limited grants to help cover cancer-related costs such as transportation to treatment, child care, or help needed around the home. CancerCare can also refer you to other resources in your community that can provide assistance.

# Frequently Asked Questions

**Q Why are targeted treatments used with regular chemotherapy?**

**A** Before targeted treatments were developed, our standard of treatment was—and still is, in many cases—chemotherapy such as cisplatin (Platinol and others) or docetaxel (Taxotere), for example. Combining chemotherapy with targeted treatments can produce even better results in some patients. Chemotherapy has the cell-killing power. When you combine that with the ability of targeted treatments to knock out the mechanisms in cancer cells that help them grow and multiply, it's like delivering a "one-two punch."

**Q My husband's doctor has recommended stereotactic radiotherapy for stage I lung cancer. What is this?**

**A** Stereotactic radiotherapy (or radiosurgery) is a promising new technology used to deliver very high doses of radiation directly to tumors. The technology precisely targets narrow radiation beams coming from many different angles directly on the tumor. This spares most of the surrounding normal lung tissues from exposure to radiation. It has shown promise as an alternative to surgery for people with early-stage lung cancer for whom surgery might not be safe because of age, for example, or poor health. Both the size and position of the tumor in the lung are also considered in deciding whether stereotactic radiotherapy will be recommended to a patient as a treatment option. The procedure is painless; patients go home the same day.

**Q** Recently, I finished radiation for lung cancer, and I have now developed a terrible cough. Is my cancer coming back?

**A** Your cough may be due to a condition called **radiation pneumonitis**. This condition affects about 15 percent of people treated with radiation. It occurs when radiation irritates the lungs, causing a cough, fever, or shortness of breath during treatment or even weeks after it ends. If it doesn't go away on its own, radiation pneumonitis can be treated with medication.

**Q** I already have lung cancer. Why should I bother to quit smoking now?

**A** Quitting smoking is always recommended because of the benefits:

- fewer treatment complications;
- a lower chance of the tumor coming back after treatment;
- a lower risk of having a second lung tumor; and
- longer survival.

And if you want to quit, there is a lot of help available. Talk to your doctor about smoking cessation programs and medications that are available to help you quit.

**Q** I've had numbness and tingling in my fingers and toes since I've been undergoing chemotherapy. Is there anything I can do about it?

**A** You're most likely experiencing a fairly common side effect of chemotherapy called **neuropathy**. The pain results from nerve damage, and it can lead to a burning sensation, a feeling of "pins and needles," or numbness. Neuropathy usually fades over time and may go away once you stop chemotherapy. But it's important to tell your doctor or nurse *immediately* about your symptoms so that they can be treated effectively. Another reason this is so important is that your health care

team may need to re-evaluate your treatment by changing the dose, for example. A number of medications offer relief from a burning or prickly sensation. These drugs are prescribed “off label” because they were designed to treat other medical conditions. Your medical oncologist may refer you to a doctor of rehabilitation medicine or a neurologist.

**Q I read in a magazine article that Avastin only extends life by about two months. Is that accurate?**

**A** That number probably came from the findings of a clinical trial. When researchers look at these findings, they figure out the average length of time a drug prolongs the lives of all the trial participants. The average number includes people who had no benefit from the drug as well as people who experienced many years of life after treatment with bevacizumab (Avastin). Although the findings provide an average, they don’t predict exactly what will happen to an individual who takes Avastin. Each person’s cancer is different, so any one number doesn’t tell the whole story.

**Q A friend of mine is in a clinical trial for non-small cell lung cancer. She is being treated with Avastin at a large research hospital. When she mentioned the idea of having her tumor tested to see what genes it contains, her doctor was not receptive. Is personalized treatment available for many people?**

**A** There are some barriers to testing the genes of lung cancer tumors. One is that most types of tests require a large tumor sample. Only about a quarter to a third of people with lung cancer have enough tissue that has been removed and is available to be tested properly. And it can be difficult for patients and their doctors to weigh the risks versus the benefits of removing additional tissue samples for testing. In some cases, a gene test is not the right sort of test to use. That may have been the reason your friend’s doctor declined her request.

The second issue is that tumor testing isn't necessary for some people, especially if their treatment is working. Your friend's doctor will probably recommend that she continue the treatment as long as it's effective and is not causing harmful side effects. You should also know that doctors do have the technology, such as CT scanning, to determine whether or not a drug is working within two or three weeks of starting treatment.

**Q I have bronchioalveolar carcinoma, and I would like to know why this type of lung cancer is inoperable.**

**A** Many people with bronchioalveolar carcinoma do have successful surgery for their cancer. But whether surgery is an option, and whether it will work, usually depends on the extent of the cancer. If a person's lung cancer has spread to other parts of the lung or to both lungs, he or she is not likely to benefit from surgery.

# Glossary

**adenocarcinoma** A type of non-small lung cancer found in the mucous glands of the lungs. This is the most common type of lung cancer in people who have never smoked.

**adjuvant chemotherapy** The use of anti-cancer drugs after surgery to prevent the return of a tumor that has been removed surgically.

**biopsy** Removal of a small piece of tissue. The tissue is examined under a microscope for cancer cells.

**bronchial tubes** Branches of the windpipe through which air passes to and from the lungs.

**bronchioalveolar carcinoma** A type of adenocarcinoma that forms near the lungs' air sacs.

**CT scanning** See helical or spiral computed tomography below.

**epidermal growth factor (EGF)** A substance that promotes cell growth by attaching to receptors called epidermal growth factor receptors. The more receptors on a cell, the more it grows and divides. Targeted treatments such as erlotinib (Tarceva) work by blocking these growth factor receptors.

**epidermoid carcinoma** (also called squamous cell carcinoma) A type of non-small cell lung cancer found near the bronchus, the area of the windpipe (trachea) that divides into tubes. Usually linked to smoking.

**helical or spiral computed tomography (CT scanning)** A special type of x-ray study used to detect the spread of disease or track the progress of treatment.

**large cell carcinoma** A type of non-small cell lung cancer that forms near the outer edges of the lungs and spreads quickly.

**lobectomy** When a surgeon removes an entire lobe, or portion, of the lung. The lungs consist of five lobes, three in the right lung and two in the left. Lobectomies are often the most successful type of surgery for non-small cell lung cancer.

**lymph nodes** Small “filtering stations” that remove waste and fluids and help fight infections. When cancer cells spread to lymph nodes, they can travel throughout the body and form tumors far from their original site.

**neuropathy** Nerve damage, a fairly common side effect of chemotherapy. Patients can experience a burning sensation, feeling of “pins and needles,” or numbness.

**non-small cell lung cancer** About 85 percent of lung cancers are this type. Within this category there are three subtypes: epidermoid carcinoma (also called squamous cell carcinoma), adenocarcinoma, and large cell carcinoma.

**radiation pneumonitis** Cough, fever, or shortness of breath that sometimes occurs as a result of radiation treatment of lung cancer.

**second-line chemotherapy** A second course of chemotherapy given if the first course of chemotherapy is not effective, or if cancer comes back.

**stereotactic radiotherapy** Also known as radiosurgery, this promising new technology delivers very high doses of radiation directly to tumors.

**small cell lung cancer** Accounts for 15 percent of all lung cancers. The cells are small but multiply quickly and form large tumors that can spread to the lymph nodes and to other organs, including the brain, liver, and bones. Smoking is almost always the cause.

**targeted treatments** Treatments that attack cancer cells primarily, sparing normal, healthy tissues.

**tumor(s)** An abnormal growth of body tissue, in this case, cancer cells. Doctors sometimes call a tumor a lump, lesion, mass, or neoplasm.

**vascular endothelial growth factor (VEGF)** A substance released by cancer cells. It stimulates blood vessels to penetrate a tumor and supply it with oxygen, minerals, and other nutrients. These nutrients help the tumor grow.

# Resources

## **CancerCare®**

1-800-813-HOPE (4673)

[www.cancercares.org](http://www.cancercares.org)

## **American Cancer Society**

1-800-227-2345

[www.cancer.org](http://www.cancer.org)

## **Lung Cancer Alliance**

[www.lungcanceralliance.org](http://www.lungcanceralliance.org)

1-800-298-2436

## **National Cancer Institute**

Cancer Information Service

1-800-422-6237

[www.cancer.gov](http://www.cancer.gov)

## **National Lung Cancer Partnership**

[www.nationallungcancerpartnership.org](http://www.nationallungcancerpartnership.org)

1-608-233-7905

## **People Living With Cancer**

(Patient Website of the American Society of Clinical Oncology)

[www.plwc.org](http://www.plwc.org)

## **The Wellness Community**

1-888-793-9355

[www.thewellnesscommunity.org](http://www.thewellnesscommunity.org)

## **To find out about clinical trials:**

Coalition of Cancer Cooperative Groups

[www.CancerTrialsHelp.org](http://www.CancerTrialsHelp.org)

National Cancer Institute

[www.cancer.gov/clinicaltrials](http://www.cancer.gov/clinicaltrials)



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The information presented in this patient booklet is provided for your general information only. It is not intended as medical advice and should not be relied upon as a substitute for consultations with qualified health professionals who are aware of your specific situation. We encourage you to take information and questions back to your individual health care provider as a way of creating a dialogue and partnership about your cancer and your treatment.

All people depicted in the photographs in this booklet are models and are used for illustrative purposes only.

Chest x-ray on page 3: Simon Fraser/Photo Researchers, Inc.

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