

Lung Cancer Information

General

Lung cancer is a tumor or growth of cells in the lungs, which continue to grow and spread throughout the body. These cancer cells eventually deplete the body's energy reserves; disrupt normal organ structure and function. There are two primary types of lung cancers, both of which are associated with smoking cigarettes. Lung cancer is responsible for more deaths in men and women than any other type of cancer. A small percentage of lung cancers are related to industrial or environmental carcinogens (asbestos, radon). Most patients with lung cancer have no symptoms or sign of disease. Patients may have a mild cough, chest discomfort or weight loss. Some patients develop bloody sputum. The most common way lung cancers are found is on a standard chest x-ray through regular medical examinations. This is especially important for smokers; patients with previous cancers or symptoms of chest pain or those that cough regularly, should see their medical specialist, especially if they develop new symptoms.

Preoperative Evaluation and Staging, Common Procedures

Lung cancer is evaluated by the size of the tumor and the way it has spread to the surrounding tissue and lymph nodes. The staging of the cancers allow for helping to predict the need for additional therapies and for patient survival. Smaller tumors without spread to surrounding tissue or the lymph nodes (stage 1-2) have a high percentage of cures with surgery. More extensive spread of the tumor to the lymph nodes (stage 3-4) is less likely to be treatable with surgery and have a poorer prognosis. To determine the cancer stage, a number of imaging tests are used (See FAQ, Tests) along with surgical procedures. The surgical procedures used include bronchoscopy, which is a direct look at the airways of the lungs, and a mediastinoscopy, which is a procedure to surgically biopsy, the lymph nodes in the center of the chest around the main airways. This procedure requires a small incision at the base of the neck above the breastbone.

Treatment and Results

Lung cancer can be treated with three types of therapy: chemotherapy, radiation therapy and surgery. For certain types of tumors all three types of therapy may be used together or sequentially. Chemotherapy is an intravenous medication, which kills tumor cells. Radiation therapy uses high-powered X-rays to kill tumor cells in the path of the X-ray beam. Chemotherapy and radiotherapy has been used to treat lung cancer, but have low 5-year survival rates. If the cancer can be removed surgically, it provides the best possibility of cure. The most important determinate of surviving lung cancer is early detection. Cancers that are detected at an early stage (Stage 1-2) have survival rates as high as 70-80% at 5 years. Later stage cancers have shorter survival times, however with new types of chemotherapy and radiotherapy as a supplement to surgery many patients previously thought to be untreatable are surviving for 5 years and there is an increasing percentage of patients cured of their cancer.

Preoperative

GETTING READY FOR YOUR OPERATION

It is very important for you to be in the best possible physical condition before your operation, because it will help you recover more easily and more quickly. If you are still smoking, you must stop before your operation. If you need help with stopping smoking, please tell your doctor. It is also helpful if you strengthen your muscles before surgery. The following guidelines will help.

- **Arm exercises:**
 - You can stand or sit to do this exercise
 - place your arms level with your shoulders, so that your arms are straight and parallel to the floor
 - when you breathe in: raise your arms above your head, clasp your hands together, and hold for 2 seconds
 - when you breathe out: lower your arms slowly, exhale through pursed (puckered) lips, and stop when your arms are parallel to the floor
 - repeat this exercise 10 times
 - do this exercise 10 times a day
- **Leg exercises:**
 - you should sit in a chair to do this exercise
 - lift one leg off the chair, tightening the muscles on top of your thigh, and then straighten your leg out; hold your leg out straight for 3 seconds
 - bend your knee and lower your leg slowly; relax, and then repeat 10 times
 - do this exercise 10 times a day
- **Sniff and blow exercises:**
 - this exercise helps your diaphragm (a breathing muscle)
 - you should sit in a chair to do this exercise
 - sniff twice, hold your breath for 2-3 seconds
 - tighten your stomach muscles, and then blow out slowly
 - repeat this exercise 10 times
 - do this exercise 10 times a day
- **Other exercises:**
 - walk 1 mile, twice daily, in less than 20 minutes
 - climb 2 flights of stairs, quickly, 4 times a day

Postoperative Care

Surgery involves the staging procedures noted above followed by resection of a segment of the lung or the entire lung to remove the tumor. At the same time, lymph nodes in and around the area of the tumor are sampled to determine if the tumor has spread.

After surgery you will be in a special care facility for the initial period. You will have special monitoring for your heart and lung function as well as a plan for controlling your pain from the chest incision.

Respirator and Breathing Tube

After you have received your anesthetic in the operating room, the anesthesiologist will insert a tube through your mouth or nose into your trachea (windpipe). The tube is connected to a machine that breathes for you during your operation and while you are waking up. The tube is placed between your vocal cords and you will be unable to speak, eat, or drink as long as it is in place. Writing materials will be available for you to communicate. As soon as you are able to breathe on your own the tube will be removed. You will then be able to speak, although your throat may feel sore for a day or two. If the breathing tube has to stay in your trachea for more than several hours, you will receive medicine to help you relax until the tube can be removed.

Chest Tube

The chest tube is placed after your anesthetic and during your operation. This tube drains air and blood, which have collected around your lung during the operation. It is connected to a special collection container at the side of your bed. The nurse will measure the amount of fluid that drains into the container. Your doctor will remove the tube when the lung has re-expanded and the air and fluid have stopped draining. The tube usually can be removed in 4 to 5 days. Your doctor will decide when the tube can be removed.

Heart Monitor

Five sticky electrode pads will be put on your chest and attached to a heart monitor. This machine monitors your heart rate and rhythm and has an alarm that sounds on occasion. It is so sensitive that it may make a sound even if the nurse touches you or if you move around in bed. Do not worry if you hear the alarm often.

Intravenous (IV)/Arterial Line

You may have several IV lines. These are important for giving you fluids and medicines. The arterial line gives important information about your blood pressure, pulse, and amount of oxygen in your blood.

Foley Catheter

This tube drains urine from your bladder. It is inserted after your anesthetic and before your operation. The nurse measures the amount of urine while you are in the ICU. It is usually removed several days after surgery.

Epidural Catheter

This tube is inserted by the anesthesiologist before your operation to help treat your pain after your operation. While it is in place, you should have very little or no pain.

Patient Controlled Analgesia (PCA)

This is a pain control method where the pain medicine is in an intravenous (iv) solution and you can push a special button to give yourself the pain medicine whenever you feel you need it. The doctor will prescribe certain limits so that you cannot receive too much. If your pain is not adequately relieved, please tell your nurse so that your doctor can adjust the amount you receive.

Sequential Compression Stockings

These plastic sleeves are wrapped around your legs and squeeze your legs while you are in bed. This helps your circulation and helps prevent blood clots. When you are able to walk in the hall several times a day, you will not need to use them anymore.

Vital Signs

The nurse will check your vital signs (blood pressure, pulse, breathing rate, and temperature) and your oxygen saturation (the percentage of oxygen in your blood) to

make sure you are breathing well and recovering from your operation..

The nurse will measure how much fluid you take in (your intravenous fluid and what you drink) and how much fluid you put out (urine). So, it will be important for you to save your urine in the container given to you.

YOUR RECOVERY AT HOME

Most patients go home from the hospital about three to seven days after their operation. This section will give you some general guidelines to follow once you are home. Your nurse and/or doctor will review this information with you. They can answer any questions you might have. If you have questions, let your nurse know and he/she will get more information for you.

- **Activity**

Here are some general guidelines:

- Get up and get dressed each morning.
- Regular activity is an important part of your recovery. Use both arms as you normally would. Walking also helps your recovery. Begin with short walks, gradually increasing your distance every day. Space your activities throughout the day. Avoid rushing and stop and rest if you feel tired.
- To help your incision heal, do not lift object weighing more than ten pounds (for example, children, heavy bags of groceries) for 4 to 6 weeks after surgery.
- You may take a shower at home. The Steristrips (paper stitches) will fall off by themselves in a few weeks.
- You will usually be able to drive 3 weeks following your procedure (discuss with your doctor).
- You will usually be able to return to work in 4 weeks (discuss with your doctor).

Here are some specific guidelines:

- **Breathing exercises**

Why? Deep breathing exercise should be continued at home so that your lungs will stay clear. You should continue with the deep breathing exercises until your cough does not produce mucus (sputum). The deep breathing exercises usually are most effective when you are sitting in a chair with your back well supported.

How? Place both hands over the lower front part of your rib cage. Take a deep breath in through your nose and blow out slowly through your mouth with pursed (puckered) lips. With each deep breath, try to expand your rib cage as much as possible. Take four deep breaths in a row and then rest. After 10 minutes of deep breathing, take one deep breath in, support your incision with a pillow and cough. This exercise should be done at least twice a day if you continue to cough up mucus.

- **Shoulder range of motion exercises**

Why? Your shoulder on the side of your operation may become stiff. Therefore, range of motion exercises should be done 2 to 3 times a day until your shoulder is

not stiff anymore. These exercises are best done in front of a mirror so that you can watch your posture.

How?

- 1. With both hands clasped together, lift your arms straight up over your head and then lower to the starting position. Repeat 5 times.
- 2. With both hands clasped together, lift your arms up over your head and touch the back of your neck. Then lower your hands to the starting position and repeat the exercise 5 times.
- 3. Place one hand behind your back and with the tip of your thumb; try to touch your shoulder blade. Lower your hand to the starting position, and repeat 5 times.

- **Posture**

Keeping your back straight (keeping a good posture) is important after your operation, so that your lungs can expand properly. Therefore, keep your shoulders level and your back straight when you sit, stand, and walk.

- **Diet**

It is important to eat a well-balanced diet to promote healing of your incision.

Your appetite should return to near normal after a few weeks, especially as your activity increases. If your appetite is poor, try to eat high calorie and high protein foods. Small meals, 4 to 6 times a day, may be easier to eat. If you are not eating enough, a vitamin supplement can be used.

Constipation is a common problem after surgery, usually caused by the pain medicines. Drinking plenty of fluids and eating fresh fruit or bran will help prevent this problem. Your doctor may order a stool softener for you. Please tell your doctor if this becomes a problem.

- **Medications** It is not unusual to have increased pain the first few days you are home due to increased activity. Your doctor may order pain medicine for you to use at home. Your pain will slowly decrease as healing occurs, but you may be stiff or achy for up to three months after surgery, especially on cold or wet days. You may have pain in your incision for several weeks after your operation, and you will be given pain medicine to take at home. Do NOT take pain medicine before driving or with alcohol.

By 6 to 8 weeks after your operation, most of the pain in your incisions will be gone. You will also notice that the "bump" along the incision will have gone down. It is normal for the area around your incision to feel numb for many months, and this will improve with time. This numbness may be worse on cold or damp days.

- **Wound Care**

Tightness, itching, numbness or tingling around the incision area are often normal. These feelings may last for about 6 to 12 weeks, or longer.

- **When To Call Your Doctor**

Call your surgeon if you have any of the following signs or symptoms:

- a large increase in mucus coughed up from your lungs.

- a change in the color of the mucus (for example, yellow, green, bright red).
- difficulty breathing or new shortness of breath.
- a fever of 101.5 for more than 24 hours.
- your incision becomes red or more painful.
- increased, constant, or smelly drainage from the incision.

Call your family doctor soon after you go home to let him/her know that you have left the hospital. Your family doctor will receive a copy of your operative note, pathology report, and discharge summary from your Surgeon, shortly after you are discharged.

Frequently Asked Questions

1. What does the diagnosis mean-impact on life style and survival?

Lung cancers in general will progress and limit life expectancy. Most patients with lung cancer live between 2 to 3 years if adequate treatment is not received. Because lung cancer is usually without symptoms, it is usually discovered in an advanced stage and is not curable.

2. What are the causes of this problem?

Lung cancer is primarily related to smoking. Certain types of lung cancers are related to exposure to industrial materials (Asbestosis) or environmental toxins (Radioactive material) but these are rare in comparison to the patients that have a smoking related cancer.

3. How common is it?

Lung cancer is the most common form of cancer in men and women. Approximately 160,000 will die from lung cancer in 1999 (American Cancer Society).

4. Tests, how does a patient prepare?

CAT Scanning

Computerized Tomography uses X-rays to create a picture of the body in ½ inch slices. The final product is an image of the internal organs at multiple levels through the body. When these levels are further "added" together, a three-dimensional picture of an organ or abnormal body structure can be obtained.

What are CAT scans used for in lung cancer?

CAT scans are used in the chest to identify tumors, cysts, or infections that may be suspected on a chest x-ray. CAT scans of the abdomen are extremely helpful in defining abnormal anatomy that could reflect tumor spread. In addition, the images of body can guide the radiologist in performing certain procedures, such as biopsies of suspected cancers, removal of internal body fluids for testing. These procedures can decrease the need to perform surgery.

How does a patient prepare for CAT scanning?

In preparation for a CAT scan, patients are often asked to avoid food. If the patient has a history of allergy to contrast material (such as iodine), the requesting physician and radiology staff should be notified. The technique is painless; it requires 20-30 minutes of lying still in the scanner. The most common problem is an adverse reaction to intravenous contrast material that makes many organs and structures, such as the kidneys and blood vessels much more visible on the CAT scan. There may be resulting itching, a

rash, hives, and flushing. These are usually limited reactions and go away rather quickly. The amount of radiation a person receives from the CAT scan is minimal. If a woman is pregnant, there may be a potential risk to the fetus and she should inform the technicians and doctor of her condition.

Pulmonary Function Testing

Pulmonary Function Testing (PFT's) measure airflow, lung volume capacity and the efficiency of the lungs at oxygenating the blood. The test helps your doctor understand the reasons for your symptoms (shortness of breath), the extent of lung disease, and help determine therapy.

The Spirography

In this test a patient blows into the testing apparatus as rapidly and as hard as they can. Two good trials are required for an accurate test. This test measures the airflow and is useful in detecting the presence of an obstruction to airflow. If the Spirogram is abnormal, a bronchodilator medication is usually given to the patient, and the Spirogram is then repeated.

Lung Volume Determinations

The patient breathes a special gas mixture with a normal respiratory effort for about three minutes and then slowly exhales. It is possible to determine not only the volume of gas in the lung and also the volume that is being used efficiently.

The Diffusion Capacity

In this test the patient exhales fully, then breathes in a special mixture of gas. When the patient exhales after about 10 seconds of breath holding, the expired breath is collected in an airtight bag and analyzed. The results of the diffusion capacity test correlates with the body's ability to extract oxygen from the lungs.

What are pulmonary function tests used for in lung cancer? PFTs help determine your capacity to undergo treatment and surgical resection of part or the entire lung. PFTs also help your surgeon estimate the risk of surgical procedures.

How does a patient prepare for pulmonary function tests? There is no preparation necessary the testing takes 20-30 minutes in the PFT laboratory.

Arterial Blood Gas Analysis (ABG's)

To obtain a blood sample for ABG's, a needle is placed in an artery. The sample is collected under sterile conditions and run through an analyzer. The analyzer produces three main measurements: the acid base balance, the oxygen level and the carbon dioxide level. The ABG's provide important information about lung and body function.

What are ABG's used for in lung cancer? ABG's along with PFTs help determine your capacity to undergo treatment and surgical resection of part or the entire lung.

ABGs also help your surgeon estimate the risk of surgical procedures.

How does a patient prepare for ABG's and how is it performed? There is no preparation necessary the testing takes 20-30 minutes in the PFT laboratory.

Bone Scan

A Bone scan in Nuclear Medicine is a procedure. Patients receive an injection of a small amount of radioactive tracer that is injected in a vein. The tracer has no side effects and because of this, the patient can be released from the department. After the three hours have elapsed, the patient returns to the Nuclear Medicine department for their scan. The patient is placed on a table a head to toe scan is performed by a "gamma camera". In most instances, a whole body study is performed since the amount of radiation a patient receives is constant so extra views of the skeleton. An abnormal bone scan will appear as increased uptake of the tracer where bone formation is abnormal.

What are bone scans used for in lung cancer? This test is used to detect cancer that has spread to the bones.

How does a patient prepare for bone scanning, and how is it performed? The scan takes usually takes one hour to complete however the time required in the Nuclear medicine department is 4-5 hours. There are no dietary restrictions so the patient may eat before and after the injection.

MRI

MRI stands for Magnetic Resonance Imaging. It creates pictures, of the internal structures of the body in a fashion similar to CT scanning, but introduces a new technology that images your body organs and chemistry without radiation. MRI (magnetic resonance imaging) uses radio waves.

What are MRI scans used for in lung cancer? MRI scanning provides similar information to that assessed by CAT scanning. Some additional information about vascular and bony structures can be clearer on the MRI. This may be useful for tumors invading the central part of the lung or the chest wall. It can also be used to evaluate spread of tumor to the liver or bone.

How does a patient prepare for MRI scanning? In preparation for an MRI scan, patients are often asked to avoid food The technique is painless, it requires 30-60 minutes of lying still in the scanner, which is an enclosed magnet.

Ventilation/Perfusion Lung Scanning?

Ventilation/ Perfusion scan (V/Q) is a Nuclear Medicine is a procedure. Ventilation/perfusion lung scanning involves the generation of an image by radiation emitted from radioisotope tracers introduced into the lungs. The primary indication for lung ventilation and perfusion scanning in lung cancer is to assess lung structure and

function prior to surgery. In the Ventilation test, lung fields are viewed following the inhalation of a radioactive gas. In the Perfusion scan, radioactive particles are injected into the blood stream intravenously and scanned in the pulmonary bloodstream. Normal findings in the test will show a homogeneous distribution of activity throughout the lungs. A number of diseases create abnormalities in either ventilation or perfusion or both.

What are V/Q scans used for in lung cancer? V/Q scans help determine your capacity to undergo treatment and surgical resection of part or the entire lung. ABGs also help your surgeon estimate the risk of surgical procedures.

How does a patient prepare for V/Q scanning, and how is it performed? There is no preparation necessary the testing takes 20-30 minutes in the Nuclear medicine department. There are no dietary restrictions so the patient may eat before and after the injection.

Positron Emission Tomography (Pet) Scanning

Pet scanning using positron emissions to demonstrate tumors because of their higher metabolic rate. This procedure is a nuclear medicine study, which requires intravenous drug administration.

What are PET scans used for in lung cancer? Pet scans can detect tumor spread in the chest and body without requiring a surgical biopsy in many cases.

How does a patient prepare for PET scanning? In preparation for a PET scan, patients are often asked to avoid food. The technique is painless; it requires 30-60 minutes of lying still in the imager.

5. What are the treatment options?

Lung cancer can be treated with three types of therapy: chemotherapy, radiation therapy and surgery. For certain types of tumors all three types of therapy may be used together or sequentially. Chemotherapy is an intravenous medication, which kills tumor cells. Radiation therapy uses high-powered X-rays to kill tumor cells in the path of the X-ray beam. Chemotherapy and radiotherapy has been used to treat lung cancer, but have low 5-year survival rates. If the cancer can be removed surgically, it provides the best possibility of cure.

6. What is involved in the surgery?

Personnel

Lung surgery usually requires one surgeon with one or two assistant surgeons. Anesthesiologists with experience with these types of cases additional expertise as does an experienced nursing staff both in the operating room and recovery area

Time

Lung resections can take from 1 to 4 hours to complete depending on the associated procedures such as mediastinoscopy or chest wall resection.

Anesthesia

General anesthesia is required often with special manipulation of the lung ventilation to assist in the surgical exposure

Approach

The surgical incisions used vary related to the location and size of the tumor. Some tumors can be removed through a surgical telescope with 1 to 2 cm incisions others require extensive long incisions of the bone and muscles of the chest

End results

The goal of the operation is to remove the entire tumor with a marginal of healthy tissue and to assess through tissue sampling the spread of the disease

Recovery-hospital and home, pain control

Most patients recover over a 3 to 7 day period with the initial care often in a special care unit such as an ICU. At home most patient gradually return to a normal level of activity by 2 to 4 weeks. Initially special measures for pain control are used such as a catheter placed around the spinal cord (epidural) or intravenous pain medications. Medication for pain are given by mouth within the first several days of the procedure and usually required at home in decreasing amounts over the first 4 weeks following the surgery.

Risks

All patients undergoing chest surgery are at risk for death from injury or manipulation of their heart or the great vessels in their chest. For procedures in the peripheral lung the risk is low at less than 1% with good heart and lung function. More extensive procedures, such as the removal of the entire lung are associated with a 3-5 % mortality rate. Heart attacks, strokes, and lung failure are rare but can occur. Abnormal heart rhythms, lung and soft tissue infections are the most common complications and occur in 10 to 20% of patients.

7. Long-term benefits of Surgery?

If surgery can completely remove the tumor, a large percentage of patients can be cured of there disease.

8. Follow-up and additional long term therapy?

Most patients are seen within the first several weeks following discharge and again within the first 2 months. There after patients are usually seen every 3 months for the next year and followed testing at 6 months and yearly. After the pathologist has examined all the tissue from surgery, it may be necessary to supplement the surgery with additional radiation therapy or with chemotherapy

9. How do I evaluate my Surgeon?

Surgeons that perform chest surgery should be able to present credentials indicating special training in chest surgery. This should include board certification

in Thoracic surgery and membership in surgical societies specializing in chest surgery. Your surgeon should be able to tell you the how many cases he has performed and how many he performs at the hospital selected for the surgery. He should also indicate how he and the hospital team have specialized to treat patients requiring this procedure.

10. Is a second opinion necessary?

Lung surgery is a major procedure with significant possible complications. A second opinion is always reasonable in such circumstances.

11. Will I need a blood transfusion?

Depending on the magnitude of the procedure between 5 and 10% of patients receive blood transfusions. All patients are screened and have blood available during their surgery.

12. How will the surgery affect my daily activities?

After returning home, you will be anemic and have some degree of discomfort with activity. We recommend no significant heavy lifting or vigorous stretching exercises for 2 weeks following the surgery. During this period we recommend regular activity, monitoring temperature, pulse and breathing and continuing prescribed medications and rehabilitation programs. This prevents patients from regular work activity for at least 2 to 4 weeks.

13. How urgent is the problem and how quickly should it be treated?

A lung cancer should be considered an urgent problem to be evaluated and treated within a period of weeks following discovery.

14. How do I get started toward treatment?

You should contact your primary physician for a referral to a specialist to start testing and arrange for a surgical evaluation.