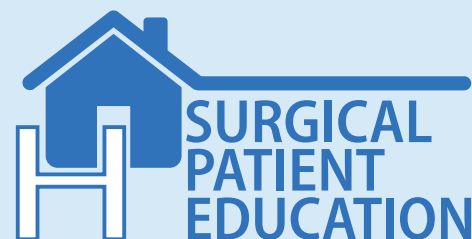




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## AMERICAN COLLEGE OF SURGEONS DIVISION OF EDUCATION SURGICAL PATIENT EDUCATION



AMERICAN COLLEGE OF SURGEONS

*Inspiring Quality:  
Highest Standards, Better Outcomes*

## Welcome

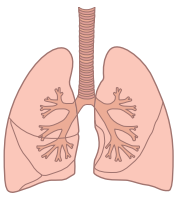
You and your family are important members of the surgical team. The American College of Surgeons (ACS) “Your Lung Operation: Education for a Better Recovery” program will help you prepare for your operation and recovery. You and your family will know what to expect. You will learn how to work with your surgical team to ensure that you have the best surgical outcomes.

### COMPLETE THE “YOUR LUNG OPERATION” EDUCATION PROGRAM:

- Watch the DVD
- Read the booklet
- Review the Medication List and Quit Smoking Resources (inside front cover)
- Complete the Activity Log (inside front cover)
- Send us your evaluation after your postoperative visit or 2 to 3 weeks after your operation (inside back cover)

### THIS PROGRAM WILL HELP YOU UNDERSTAND:

- Your lungs and the type of operation you may need
- The tests and home preparation needed weeks before your operation
- How your surgical team (including you) will work to ensure the best recovery while you are in the hospital and at home



# Your Lungs

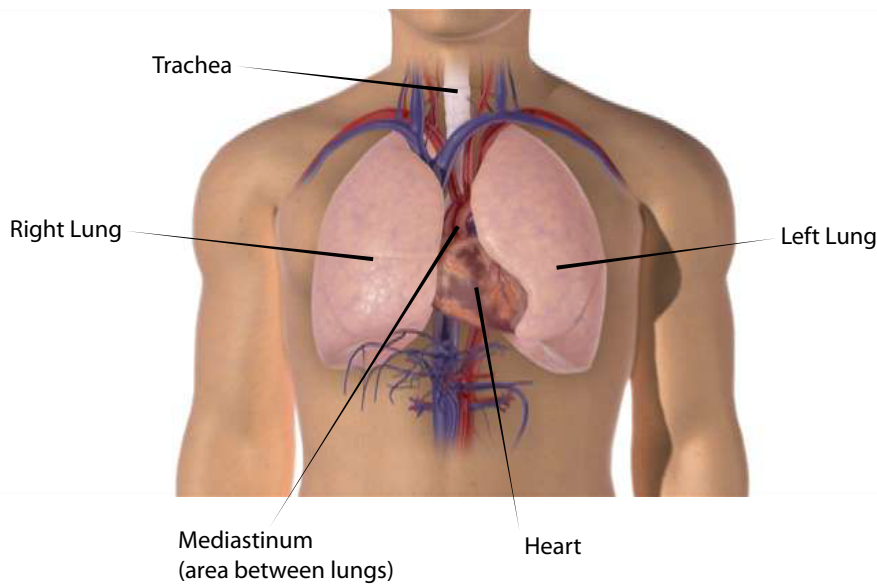
## Who Needs a Lung Operation?

The main reason for having an operation on your lung is to remove a lung nodule or tumor. Other reasons include:

- An abnormal X ray
- Treatment of infection or scarring around the lung
- Removal of sections of the lung that are diseased

## Understanding Your Respiratory System

Knowing how your lungs work is helpful in understanding your operation.



### YOUR LUNGS

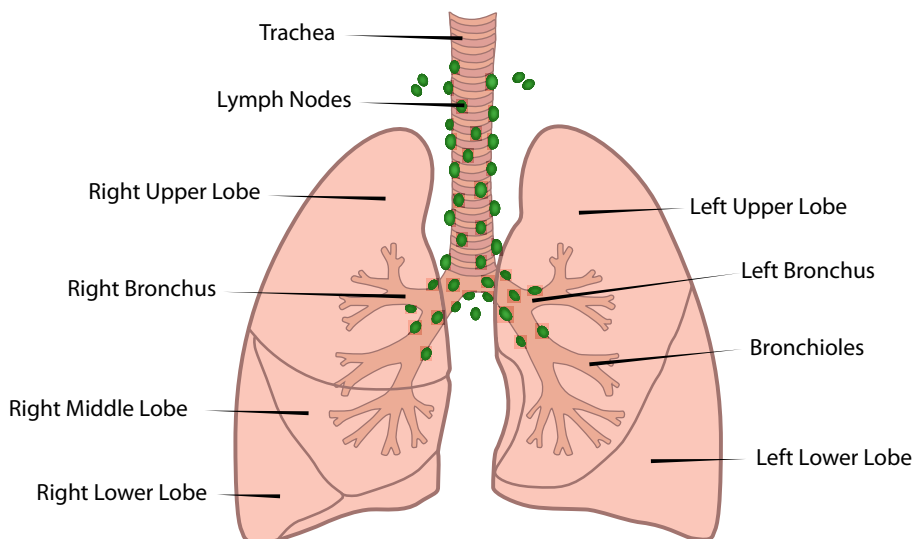
When you take a breath, air and oxygen pass from your mouth and nose through your trachea (windpipe) and right and left bronchus and into your lungs. Your lungs carry the oxygen through small tubes called bronchioles, and then to the alveoli. The alveoli are where the oxygen meets with the bloodstream. Oxygen is provided to the blood, and carbon dioxide is released back into the alveoli. As you breathe out, the carbon dioxide gas exits through your lungs and then out through your mouth.

### LUNG LOBES

The lungs are divided into lobes. There are 3 lobes on your right side and 2 lobes on your left side.

### LYMPH NODES NEAR THE LUNGS

The lungs also have a large supply of lymph nodes. The lymph nodes are small, round masses of tissue that filter the blood and trap cancer cells and bacteria.





## Understanding Lung Cancer Staging

If you are having this operation to remove a lung tumor, you will need to know a little more about the staging of lung cancer.

### LUNG CANCER CELLS

Lung cancer starts in the cells lining your lungs. Cancer cells grow faster and look abnormal in comparison with your healthy cells. The cancer cells continue to grow and eventually can be seen as a tumor on imaging tests. The cancer cells can spread (metastasize) to other parts of the lung and body. The stage of your cancer is determined by the size of the tumor and if there is spread to other areas. These areas include nearby lymph nodes and the mediastinum (area between the lungs).



### YOUR CANCER REPORT

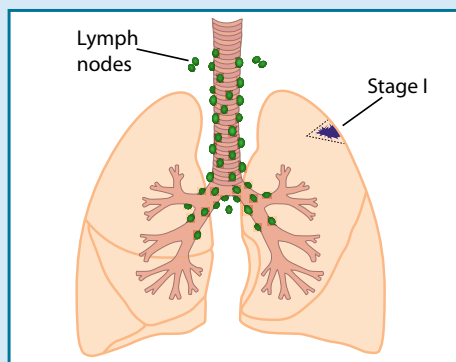
On your cancer report, you may also see the letters TNM. These are the letters used for cancer staging. They mean:

- T:** Tumor size
- N:** Nearby lymph nodes
- M:** Metastasized or spread to other organs of the body

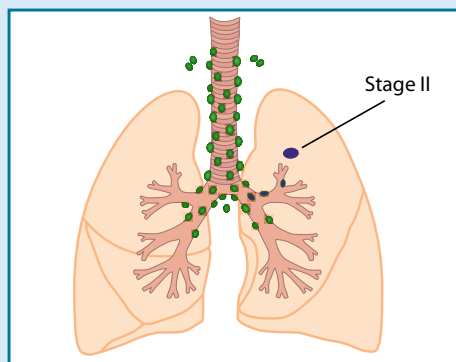
### CANCER STAGE: NON-SMALL-CELL LUNG CANCER

The stages for non-small-cell lung cancer range from I, where there are some abnormal cells lining the airway, to stage IV, where the tumors have spread to other organs of the body.

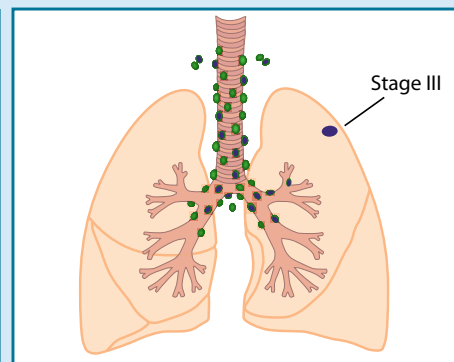
For more information on cancer staging, please visit the CancerCare website at <http://www.lungcancer.org/reading/staging.php>.



**Stage I.** The tumor is in the lung only and has not spread to the lymph nodes. It is 3 cm or less in size.



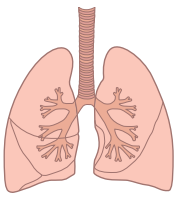
**Stage II.** The tumor has spread to lymph nodes within the same lung. The tumor size is between 3 to 7 cm and may be blocking airways.



**Stage III.** The tumor size is more than 7 cm. It has spread to the lymph nodes outside of the lung. For Stage IIIA, the cancer remains on the same side as the original tumor.

For Stage IIIB, the tumor has spread to lymph nodes above the collarbones or to the opposite side of the chest. The tumor can also be growing into the space between the lungs, the heart or large blood vessels, the trachea, and the esophagus.

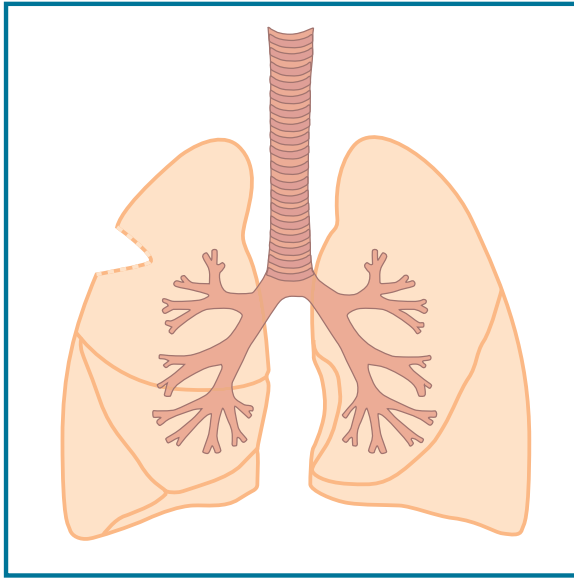
**Stage IV.** The tumor has spread to other parts of the body, such as the liver, bones, or brain.



# Understanding Your Operation

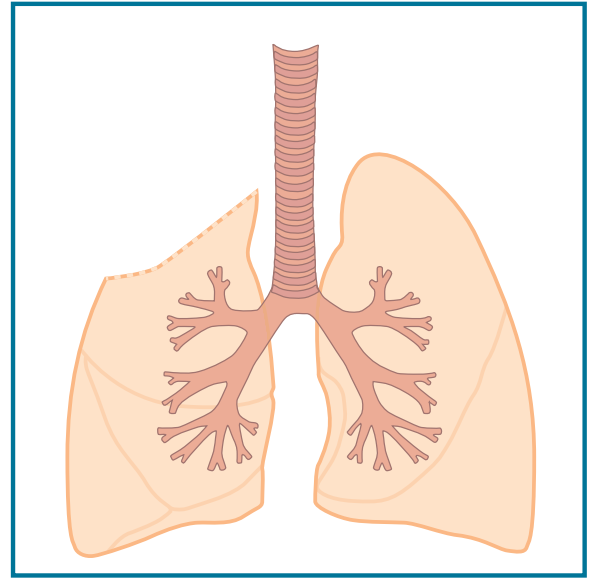
## Your Operation: Removing a Section of Your Lung

There are different approaches that your surgeon can do to remove part of your lung. The approach is based on the location and extent of your disease, the surgeon's level of expertise, and your overall health.



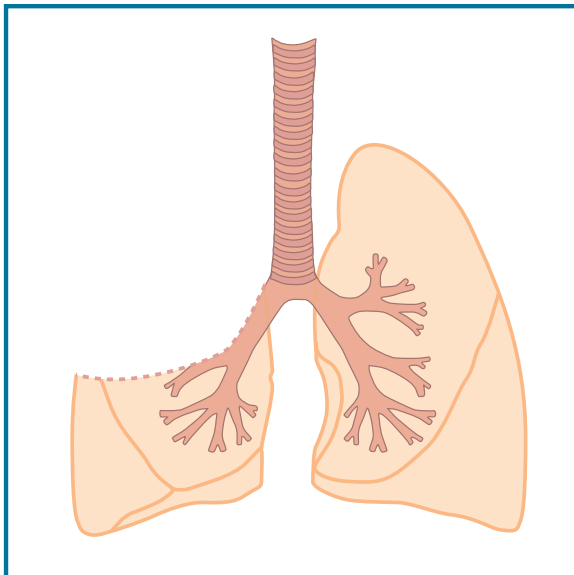
### Wedge Resection:

A small, pie-shaped section from a lung lobe is removed.



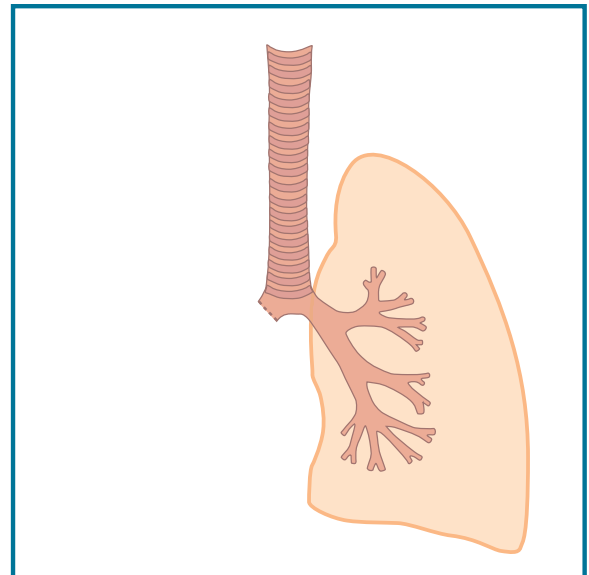
### Segmentectomy:

Each lobe contains between 2 and 5 segments. A segmentectomy removes one or more segments but less than the entire lobe.



### Lobectomy:

An entire lobe is removed. The rest of the lung inflates to fill up the space.



### Pneumonectomy:

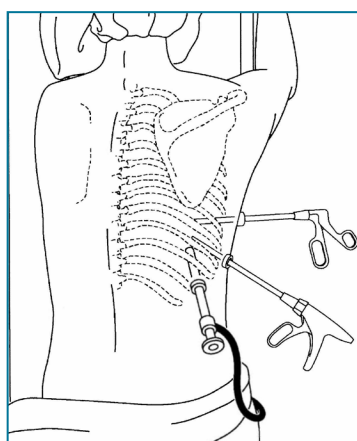
An entire lung is removed. The sac that contained the lung (pleural space) fills with fluid.



## Your Operation: Surgical Approach

### VIDEO-ASSISTED THORACIC SURGERY (VATS)

For a VATS procedure, 2 to 4 small incisions are made on the chest. Each incision is about 1 to 3 centimeters in length. Surgical tools and a thoracoscope (tube with a video camera and light source) are placed in the incisions. The lung tissue is cut away and placed in a small bag and then removed through an incision.



### THORACOTOMY

A 3- to 8-inch incision is made on your chest. It can extend from under your arm around to your back. Some muscle is cut, and the ribs are spread apart. Occasionally a small portion of the rib must be removed to allow access to the lung. Sometimes smaller incisions under or near the armpit can be used for this procedure. This procedure is called a mini-thoracotomy. The size and location of the incision depends on the part of the lung being removed.

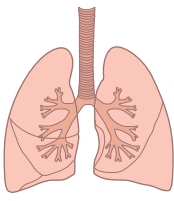


### OTHER SURGICAL PROCEDURES

On rare occasions, your surgeon may decide to go in through the middle of your chest (median sternotomy). This approach may be used to reach both right and left lungs, as well as lymph nodes in the mediastinal area.

### Nonsurgical Approach

For patients who cannot have an operation due to other medical conditions, stereotactic radiation therapy or other removal techniques may be an option.



# Preoperative Tests

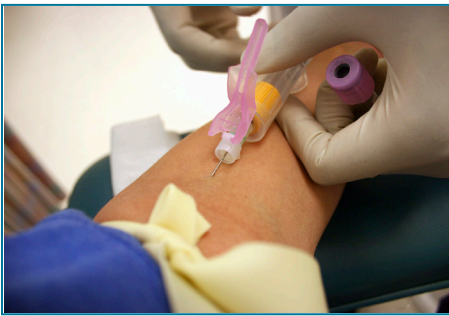
Preparation for your lung operation is important and can take time. It involves many tests, procedures, and discussions with your surgeon about your care and possible enrollment in clinical trials. There are also things you need to start doing at home weeks before your operation.

## Tests and Procedures

These tests help identify your current pulmonary (lung) function, the extent of your disease, and your overall state of health.

Tests may include:

- Complete history and physical
- Blood test
- Urinalysis
- EKG
- Scans (CT, MRI, PET)
- Chest X ray
- Pulmonary function test



## Scans

### COMPUTERIZED TOMOGRAPHY (CT) SCAN

A CT scan is a special X ray that takes detailed cross-sectional images of the chest.

### POSITRON EMISSION TOMOGRAPHY (PET) SCAN

A PET scan uses a small amount of tracer injected into a vein. The scan then measures the amount of tracer absorbed by certain organs or tissues. Often a combined CT/PET scan is used to estimate if the tumor has spread.

### MAGNETIC RESONANCE IMAGING (MRI)

A MRI uses radio waves and a magnetic field to get detailed images of body organs. A brain MRI is the most sensitive test to detect brain metastasis.



### Pulmonary Function Test (PFT)

A PFT measures the amount of air that you can breathe in and how much oxygen gets into your bloodstream. You usually shouldn't eat or smoke for 4 to 6 hours before the test. Also, let your doctor know if you are using any inhalers.





## Types of Lung Biopsy Procedures

Your surgeon will determine if you need a biopsy (tissue sample). Sometimes a biopsy is done during the operation. After the biopsy, the tissue sample is viewed under a microscope and checked for cancer cells.

Sedation medication to help you relax or sleep is given before many of these procedures. You will need someone available to drive you home if sedation is used.

## BRONCHOSCOPY

A scope (thin tube with a light source on the end) is placed through your mouth or nose and into your trachea and large airways. A small amount of tissue from the surface of the airways is removed.



## IMAGE-GUIDED FINE NEEDLE BIOPSY

Lung tissue is removed with a thin needle placed through the chest wall. An ultrasound or CT scan is used to locate exactly where the needle should be inserted. After the biopsy, a chest X ray will be taken to make sure that there is no air leaking from the lung.

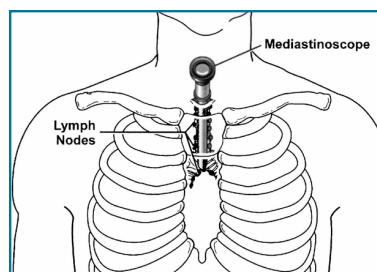


## ENDO-BRONCHIAL ULTRASOUND (EBUS)

A scope with a small, narrow needle hidden inside the tip of the scope is used. When the node or biopsy site is seen by the scope, the needle is inserted, and a sample of tissue is removed.

## MEDIASTINOSCOPY

A scope is inserted between the lungs in a small incision made above the breastbone or alongside the breastbone. Tissue and/or lymph nodes are removed through the scope.



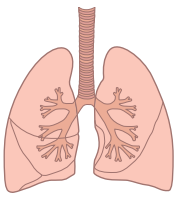
## BIOPSY OBTAINED DURING THORACOSCOPY OR VIDEO-ASSISTED THORACIC SURGERY

A small cut is made in the skin between 2 ribs. A scope is inserted through the ribs and directed to the tumor site. The tissue is removed. The biopsy may lead to removal of a section of lung tissue.

## Clinical Trials

You may be asked to participate in a research study or clinical trial. Participation in a clinical trial may allow you access to newer experimental treatments. The clinical trial may benefit you and gives you the chance to help other patients in the future. Your participation in these trials is optional. Your choice to participate will not affect the quality of care you receive. Your surgeon will discuss this possibility with you, and if you decide to participate, you will meet with a research coordinator. The research coordinator will talk to you further about the study and obtain your written permission to participate.





# Home Preparation

## Preoperative Home Skills Preparation

These are the things you can do to help get yourself ready for your operation.

## Quit Smoking

Smoking increases your risk of problems during and after your operation. Quitting 4 to 6 weeks before your operation and staying smoke-free 4 weeks after it can decrease your rate of wound complications by 50%. Quitting permanently can add years to your life.



### RESOURCES TO HELP YOU QUIT

Talk to your health care provider about the best option to help you with quitting, but know how truly important it is that you decide to quit before your operation.

The National Alliance for Tobacco Cessation provides the latest information on how to quit smoking with its program called “Become an EX.” Proven methods to teach smokers how to quit and stay quit are provided.

<http://www.becomeanex.org/>

The American Lung Association has information and plans like its “Freedom from Smoking” program, an online program that takes you through modules and provides you with the tools you need to quit.

<http://www.lungusa.org/stop-smoking/>

The American Cancer Society has helpful detailed information and a hotline number on its website. Call the American Cancer Society at 1-800-227-2345 or visit <http://www.cancer.org/Healthy/StayAwayfromTobacco/GuidetoQuittingSmoking/index>.

Successful quitting is a matter of planning and commitment, not luck. Decide now on your own plan.

## Your chance for a better recovery

### PREPARE FOR YOUR QUIT DAY

As listed on the American Cancer Society website:

- Pick the date and mark it on your calendar.
- Tell friends and family about your Quit Day.
- Get rid of all the cigarettes and ashtrays in your home, car, and place of work.
- Stock up on oral substitutes (sugarless gum, carrot sticks, hard candy, cinnamon sticks, coffee stirrers, straws, and/or toothpicks).
- Decide on a plan. Will you use nicotine replacement therapy (NRT) or other medicines? Will you attend a stop-smoking class? If so, sign up now.
- Practice saying, “No thank you, I don’t smoke.”
- Set up a support system, which could be a group program such as Nicotine Anonymous or a friend or family member who has successfully quit. Ask family and friends who still smoke not to smoke around you or leave cigarettes out where you can see them.
- If you are using bupropion or varenicline, take your dose each day of the week leading up to your Quit Day.
- Think back to your past attempts to quit. Try to figure out what worked and what did not work for you.





## YOUR QUIT DAY

### On your Quit Day:

- Do not smoke. This means none at all—not even one puff!
- Keep active. Try walking, exercising, or hobbies.
- Drink lots of water and juices.
- Begin using nicotine replacement if that is your choice.
- Attend a stop-smoking class or follow your self-help plan.
- Avoid situations where the urge to smoke is strong.
- Avoid people who are smoking.
- Reduce or avoid alcohol.
- Think about how you can change your routine. Use a different route to go to work, drink tea instead of coffee, eat breakfast in a different place, or eat different foods.



## DEALING WITH WITHDRAWAL

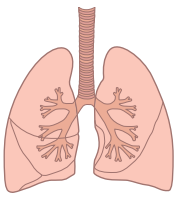
Nicotine replacement and other medicines can help reduce many of the physical symptoms of withdrawal. Most smokers find that the bigger challenge is the mental part of quitting.

If you have been smoking for any length of time, smoking has become linked with nearly everything you do—waking up in the morning, eating, and drinking coffee. It will take time to “un-link” smoking from these activities, which is why, even if you are using a nicotine replacement, you may still have strong urges to smoke.

**“Quitting smoking is probably one of the most important things that you can do to help with your recovery.”**

Traves Crabtree, MD, FACS  
Thoracic Surgeon





## Medications

Your medications may have to be adjusted before your operation. Some medication can affect your recovery and response to anesthesia. Write down all of the medications you are taking. A blank medication list is provided if you need it.

Make a list. Your list should include:

- Any prescription medications
- Over-the-counter (OTC) medications (such as aspirin or Tylenol)
- Herbs, vitamins, and supplements
- Tell your doctor if you smoke and how often you drink alcohol or use other recreational drugs.



### Check with your doctor about:

- When to stop taking all vitamins, herbs, and diet supplements (sometimes 10 to 14 days before and up to 7 days after your test or operation).
- How to take your other morning medication (usually with a sip of water) the day of your operation.
- How to adjust your insulin the morning of your operation since you will not be eating. The doctor who normally manages your insulin often develops the plan for your operation.
- The need to adjust your medication that affects blood clotting. These drugs may be adjusted up to 7 days before your operation. Your doctor will let you know when to restart taking these drugs. (See following list.)

### List of medications that affect blood clotting:\*

- **Antiplatelet Medication:** Anagrelide (Agrylin<sup>®</sup>), aspirin (any brand, all doses), cilostazol (Pletal<sup>®</sup>), clopidogrel (Plavix<sup>®</sup>), dipyradamole (Persantine<sup>®</sup>), dipyridamole/aspirin (Aggrenox<sup>®</sup>), enteric-coated aspirin (Ecotrin<sup>®</sup>), ticlopidine (Ticlid<sup>®</sup>)
- **Anticoagulant Medication:** Anisindione (Miradon<sup>®</sup>), enoxaparin (Lovenox<sup>®</sup>) injection, heparin injection, pentosan polysulfate (Elmiron<sup>®</sup>), warfarin (Coumadin<sup>®</sup>)
- **Nonsteroidal Anti-Inflammatory Drugs:** Dabigatran etexilate mesylate (Pradaxa), diclofenac (Voltaren<sup>®</sup>, Cataflam<sup>®</sup>), diflunisal (Dolobid<sup>®</sup>), etodolac (Lodine<sup>®</sup>), fenoprofen (Nalfon<sup>®</sup>), flurbiprofen (Ansaid<sup>®</sup>), ibuprofen (Motrin<sup>®</sup>, Advil<sup>®</sup>, Nuprin<sup>®</sup>, Rufen<sup>®</sup>), indomethacin (Indocin<sup>®</sup>), ketoprofen (Orudis<sup>®</sup>, Actron<sup>®</sup>), ketorlac (Toradol<sup>®</sup>), meclofenamate (Meclomen<sup>®</sup>), meloxicam (Mobic<sup>®</sup>), nabumeton (Relafen<sup>®</sup>), naproxen (Naprosyn<sup>®</sup>, Naprelan<sup>®</sup>, Aleve<sup>®</sup>), oxaprozin (Daypro<sup>®</sup>), piroxicam (Feldene<sup>®</sup>), prasugrel (Effient), salsalate (Salflex<sup>®</sup>, Disalcid<sup>®</sup>), sulindac (Clinoril<sup>®</sup>), sulfapyrazone tolmetin (Tolectin<sup>®</sup>), trilisate (salicylate combination)
- **Herbs/Vitamins:** Ajoene birch bark, cayenne, Chinese black tree fungus, cumin, evening primrose oil, feverfew, garlic, ginger, ginkgo biloba, ginseng, grape-seed extract, milk thistle, Omega 3 fatty acids, onion extract, St. John's wort, tumeric, vitamins C and E

\*The above list includes common medications but is not a complete list.

# Exercise

Deep breathing and aerobic exercise (those activities that require the lungs and heart to work harder) before and immediately following your operation may improve your recovery. Exercise helps strengthen your pulmonary muscles and expand the breathing capacity of your lungs. Several studies have shown patients breathe easier, improve their ability to do physical and social activities, and improve their overall quality of life if they do exercise before and after their operation.

**Once approved by your doctor, you can begin your daily exercise.** Try to start at least 2 weeks before your operation.

An activity log is located in the front of your booklet to record how often and for how long you do each activity. Always know that it is okay to stop whenever you feel tired.



## Breathing Exercises: Incentive Spirometer

Your incentive spirometer measures how much air can go into your lungs. It helps you to exercise your respiratory muscles and to breathe deeply.



### How to Use Your Incentive Spirometer

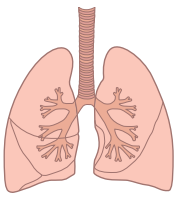
- Begin by sitting up straight.
- Hold the incentive spirometer in an upright position.
- Exhale (breathe out) normally.
- Place the mouthpiece into your mouth and seal your lips tightly around it.
- Inhale (breathe in) slowly and as deeply as you can through the mouthpiece.
- Hold your breath for at least 3 seconds, if you are able.
- Note the highest level the indicator reached.
- Exhale normally.

Repeat this procedure 5 to 10 times.

### When to Use Your Incentive Spirometer

**Before Your Operation:** Two weeks before your operation, you can use your incentive spirometer 4 to 5 times daily. If you do not get an incentive spirometer until you are in the hospital, then you can still practice by breathing deeply and holding your breath. Deep breathing exercises can be as effective as incentive spirometry.

**After Your Operation:** Use your incentive spirometer every hour while you are awake. Continue to use it 4 to 6 times per day while you are home.



# Home Preparation



## Aerobic Exercise: Walking or Riding a Bike

**Before Your Operation:** Walk or ride a stationary bike for 30 minutes each day. At first you may have to rest frequently, and that's okay. Use your activity log to record how often and how long you can exercise each day.

**In the Hospital:** You should walk at least 3 times a day.

**After Your Operation:** Continue walking or riding a bike after you return home. Mall walking is an option if you live in a cold climate. Think of this activity as doing physical therapy for your lungs. Continue to record your exercise in your log.

## Range-of-Motion Exercises

After your operation, you will have some stiffness, pain, and swelling in your upper body. Range-of-motion exercises may help to keep your muscles and joints from tightening and help you to breathe more deeply. After your operation, ask your doctor if you can begin to do these exercises. You will need to be careful not to overstretch the area of your operation or where the chest tube was located.

**Head and neck exercise:** Tilt your head so that your neck bends forward and your chin touches your chest. Then, raise your head so that you look up to the ceiling. Next, bend your head from side to side with your ear going toward your shoulder.

**Arm and shoulder exercise:** Sitting straight in a chair or standing, slowly lift your arm from your lap straight up over your head to the ceiling. Next, raise your arm from your side to the ceiling. Keep the elbow straight and your palm downward. Hold for 10 seconds. Repeat 3 to 5 times with each arm.

**Walk up exercise:** Stand by a wall. With your elbow straight, use your fingers to "crawl" up the wall or door frame as far as possible. Hold for 10 seconds. Repeat 3 times with each arm.





## Food and Drink

- You should not eat or drink starting at midnight before the operation (this rule includes candy, gum, and coffee). Usually you can take your morning pills with a sip of water, but check with your doctor. If you are a diabetic, your insulin should be adjusted.

## Shower or Bath/Hygiene

- Clean your chest area with nonscented, mild, antibacterial soap (such as Ivory or Dial) the night before. Repeat the morning of your operation. Do not shave the surgical site.
- You can brush your teeth and rinse your mouth with an antibacterial or antiseptic mouthwash. Doing so can decrease the amount of bacteria in your mouth and may decrease your risk of developing pneumonia.

## What to Bring

- Insurance card and identification
- Advance directive form
- Loose-fitting, comfortable clothes
- Nonslip shoes or slippers
- Toiletries (toothbrush, toothpaste, hairbrush)

## What to Leave Behind

- Leave jewelry and valuables at home.
- You will have to remove all dentures, glasses, contact lenses, makeup, hairpins, hairpieces, piercings, nail polish, and artificial body parts.

## Safety Checks

- An identification bracelet with your name and hospital number will be placed on your wrist. Your ID should be checked by the health care team before they provide any procedures or give you medication. If you have allergies, you will also get an allergy alert bracelet.
- You will be asked to confirm the location of your lung procedure (right or left). A member of the surgical team will mark the side with a marker.

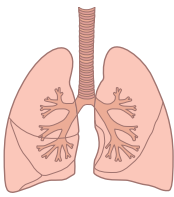


## Waiting Area

- You will change into the hospital gown, and all of your belongings will be labeled and placed in a locker or given to your family.
- You will meet with your anesthesia provider. Any health problems will be reviewed. Your postoperative pain management plan will be discussed.
- An intravenous (IV) line will be started to give you fluid and medications.

## Family Updates

- You will be in the operating room area for up to 6 hours. Ask your surgeon about how long your procedure should last.
- Your family will be called when your operation is over.



# After Your Operation

Your surgical team will closely monitor your recovery. You will be hooked up to many wires and tubes, including IV lines, a chest tube, a foley/bladder catheter, and oxygen, heart, and breathing monitors. Here is what you can expect and what we are closely watching for:

## Pain Management

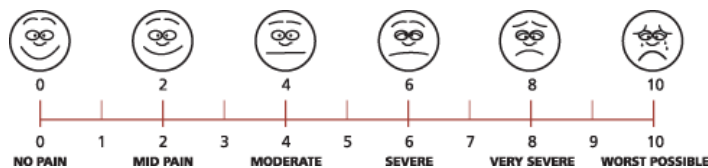
You may initially feel sleepy and not remember much about the day. As you wake up, you may have some pain and burning near the incision site and along the rib cage on the side of the operation. Controlling your pain is a top priority of your surgical team. A scale of 1 to 10 is used to measure pain. At a 0 you do not feel any pain. A 10 is the worst pain you have ever felt. Do not wait for your pain to reach 10 before telling your doctor or nurse. Extreme pain puts stress on the body and may prevent you from fully moving your chest and expanding your lungs following your operation.

## PAIN INFUSION PUMPS

Your pain will be controlled through a pain infusion pump or medication given directly through your IV. Examples of pain infusion pumps include a patient-controlled analgesia (PCA) pump, a patient-controlled epidural analgesia (PCEA) pump, and a local infusion pump.

- A **PCA pump** delivers pain medication through your IV.
- A **PCEA pump** is a small tube (epidural catheter) placed in your back. It distributes numbing medication around the nerves to your chest.
- A **local infusion pump** delivers small amounts of medication through small tubes directly near the wound site.

You should be the only person pressing the pain medication button. Family members should be aware that they are not to press the pain medication button for you. All pain pumps have high dose limits to make sure that you do not get too much medication.



## ORAL MEDICATION

You will usually be switched to oral pain medication the next day after your operation. These medications may include opioids (examples are Tylenol 3, Norco, and Vicodin) and nonsteroidal anti-inflammatory medication (examples are Ibuprofen, Ketolac, and Motrin). You may also have some sore throat pain from the tube that was placed in your throat during anesthesia to help you breathe. Throat lozenges may help with this pain.

## OTHER EFFECTS OF PAIN MEDICATION

Some pain medications may cause itching, or lowers blood pressure. Your team will monitor for these side effects.

Pain medication causes constipation. Your surgical team will ask you about when you have a bowel movement. They will also give you medication to soften your stool and assist you in having daily bowel movements.

## Confusion After Your Operation

After your operation, you may become confused. The confusion can range from mild memory loss or anxiety to fear, hallucinations, and on occasion combative behavior. Sometimes the behavior can be worse at night. The severe behavior is termed postoperative psychosis. It is rare and is seen more often with older patients, patients who experience sleep deprivation, and patients who spend longer periods of time in the intensive care unit (ICU). If these symptoms occur, your family and friends will work with the health care team to provide you with a calm, familiar, and reassuring environment.



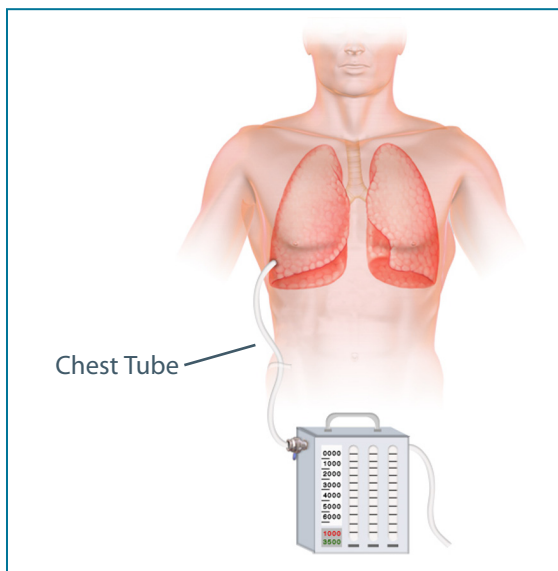
## Heart and Blood Pressure Monitoring

You may have electrodes (small bandages hooked to wires) placed on your chest to monitor your heart rate and breathing rate. You may also have an IV in your wrist that monitors your blood pressure. A fast heart rate (atrial fibrillation) may occur following a lung operation. This issue is usually temporary and is treated with medication. Let your surgical team know if you feel your heart racing or feel tightness in your chest.

## Fluid Drainage and Air Leaks from Your Surgical Site

You will have a drain or chest tube placed around your lung at the surgical site. It will be hooked up to a drainage container. Your team will measure the amount of drainage coming through the tube. Your chest tubes are removed before you go home, except on rare occasions. The amount of drainage you have will determine when your tube can be removed. You may feel some shoulder pain on the side of the chest tube.

You will also be monitored for an air leak. Air can leak from the surgical site to the space surrounding your lungs (pleural space). The chest tube will allow the air to escape into the tube. Most air leaks stop within 1 to 5 days after the surgical procedure. In rare cases, a patient may go home with a chest tube or require an additional operation. A chest X ray will be done to make sure that your lungs are fully expanded and air is not building up inside your chest cavity.



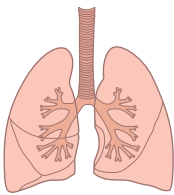
## Breathing and Preventing Pneumonia

After your operation, you may receive oxygen through small tubes placed in your nose. Your oxygen will be monitored by a sensor placed on your finger. In rare cases, you may be sent home with oxygen.

Pneumonia is an infection in the lungs. Signs of pneumonia are fever and shortness of breath. If pneumonia develops, you will be placed on antibiotics and may need additional oxygen. A bronchoscopy to remove secretions that may be blocking your airway is done on rare occasions. Smoking and having other diseases can increase the risk of pneumonia.

Studies show that there are ways to help decrease the risk of developing pneumonia in surgical patients. Some of these ways include:

- Stop smoking 2 months before your operation.
- Keep your head elevated at least 30 degrees while in bed.
- Brush your teeth 2 to 3 times daily and rinse with an antibacterial mouthwash.
- Get up and walk 3 times a day.
- Do lung expansion exercises each hour while you are awake.
  - Take 5 to 10 deep breaths each hour and hold each breath for 3 to 5 seconds.
  - Use an incentive spirometer 5 to 10 times each hour.
- Use a flutter valve, a device that helps you to cough and clear the mucus from your airways. You blow into it 4 to 5 times each hour to clear secretions. This is used mainly for patients with excess secretions and/or ineffective cough.



# After Your Operation

## Take Notes

You will probably think of questions when the surgeon is not present. Keep a notebook at the bedside to write down questions as they come to you. When the surgical team comes by on rounds, you will be ready with your list of questions and you won't miss a single one!

## Bleeding

The amount of fluid you lose through your chest tubes and incision site will be monitored. A blood transfusion is rarely needed. Your blood counts will be monitored.

## Urinary Catheter and Urinary Retention

A urinary catheter (tube) will drain urine from your bladder. Once you wake up, the tube will be removed. After the tube is removed, let your surgical team know when you go to the bathroom and urinate. If you have trouble, you may be given medication to help with normal urination. Problems urinating are more common in older men and when an epidural catheter was used to control pain. The urinary catheter may also have to be placed back in for a short time.

## Preventing Blood Clots

Blood clots can occur because of lying still and not moving during and after the surgical procedure. You will have special support stockings placed on your legs right before your operation. Sequential compression stockings (stockings that fill with air and squeeze your legs) may also be applied. Getting up and walking early and as often as possible (3 to 4 times a day) also helps decrease the risk of blood clots. Medications such as heparin, fragmin, or lovenox may be given to prevent clots. Heparin is given by injection into the abdomen and may cause black and blue spots to appear on the belly. Do not be alarmed if bruising occurs, as it is common.

## Hoarseness or Vocal Cord Dysfunction

The vocal cords are 2 elastic bands of muscle located right above the trachea. Swelling or pressure on the cord can cause changes in voice quality, hoarseness, and difficulty swallowing. These problems are usually treated initially with voice therapy.

## Preventing Infection

Antibiotics will be given through your IV line right before your operation to prevent an infection. Redness and swelling at the incision site with fever can mean that there is a wound infection. You may need additional antibiotics.





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## How Long Will You Be in the Hospital?

The typical length of a hospital stay after a lung operation is 2 to 5 days. Your stay may be longer or shorter depending on the complexity of the surgical procedure, your age, and your overall health status. Let's go through what you need to know as you recover and get ready for discharge.

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## Thinking Clearly

General anesthesia and your pain medication may cause you to feel sleepy and not think clearly. Do not drive, drink alcohol, or make any big decisions while on opioid pain medication.

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## Nutrition

- Take a multivitamin.
- Eat a balanced diet with food that is high in proteins. Proteins are necessary for recovery.
  - Some examples of foods rich in protein include meats, beans, fish, eggs, nuts, milk, and milk products.
  - If you are having trouble eating a balanced diet, you can use nutrition supplements such as Ensure, Boost, or Carnation Instant Breakfast.

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## Activity

- You should be up and walking 3 to 4 times a day. Continue to increase the length of time that you walk. Even if you can't walk far, just getting up every hour and walking around your house is helpful.
- Use your incentive spirometer every 1 to 2 hours. Your activity log allows you to write down and keep track of your spirometer usage.
- Continue doing the stretching exercises that you learned before your operation.
- Do not drive while taking prescription pain medication, or until advised by your surgeon.

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## Fatigue

It is normal to feel tired when you get home. You may require more sleep than you did before the operation.

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## Lifting Restrictions

Do not lift anything heavier than 10 pounds (a gallon of milk is 9 pounds) for 1 to 3 months after your operation. Your doctor will provide you with more information about returning to heavy lifting after your operation.

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## Pain Management and Chest Discomfort

When you first get home, you may have more pain in the evening. This is usually due to all of the activities you perform throughout the day. You might see that you can manage with one pain medication pill every 4 to 6 hours during the day, but you need 2 at night. You will gradually decrease the amount of pain opioid medication you need. You may need a nonsteroidal (such as Ibuprofen) for several weeks.

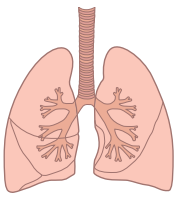
Some patients feel stiffness in the chest. This problem can be helped by taking a warm shower or by using a heating pad. Place a towel between the heating pad and your chest.

Some patients have breast or skin sensitivity and discomfort for a longer period of time. They tell us that the side of the operation feels different than the other side. This feeling can last for several months. Women say that wearing a sports bra or supportive bra that has a larger chest measurement (not cup size) is helpful. Place a small, clean gauze pad over the scar if your bra rubs the incision.

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## Frequent Coughing

Some patients have a frequent cough. You may find taking over-the-counter cough medicines to be helpful. You may cough up small amounts of dark blood the first few days after the operation, but this problem will begin to decrease over the next several weeks. The dark blood will change to mucus with just some blood streaks, and eventually to mucus with brown dried blood specks.



# Your Recovery and Discharge



## Wound Care

You may have stitches or Dermabond glue on the site where your chest tube was removed. Usually you go home with dressings or a small adhesive bandage over your chest tube site.

It is not unusual for the sites to have some drainage.

To change your dressing:

- Start by washing your hands.
- Remove the old dressing.
- Look at the wound for any redness, swelling, and drainage. The wound should not have a strong odor. On the first days, the drainage will be pink in color and then will gradually turn to a clear/yellow.
- Clean the skin around the site with soap and water.
- Let the skin dry.
- Apply a new gauze dressing attached with a small piece of tape or a new adhesive bandage.

Here are a few other things that you should know about your wound site:

- You can take a shower the day after your chest tube is removed.
- Do not soak in a bathtub until your stitches or Steri-strips are removed.
- A small amount of drainage from the incision is normal. If you are changing the dressing more than 3 times per day, or if it is soaked with blood or fluid, call your surgeon.
- If you have Steri-strips in place, they will fall off in 7 to 10 days. If they are still present after 10 days, you may remove them in the shower.
- If you have a stitch at your chest tube site, your doctor will remove it at your first postoperative visit.

- If you have skin glue, leave it in place. It will eventually fall off.
- Your scar will heal in about 4 to 6 weeks and will become softer and continue to fade over the next year.
- Avoid wearing tight or rough clothing, which may rub your incisions and make it harder for them to heal.
- Slight tingling or numbness at the site is normal and can last for weeks.

## Bowel Movement/Constipation

Pain medications can cause constipation. Regular bowel movements should resume 2 to 3 days after your operation. Drinking 8 to 10 glasses of fluid per day and eating a high-fiber diet can help.

- High-fiber foods include beans, bran cereals, whole-grain breads, peas, dried fruits, raspberries, blackberries, strawberries, sweet corn, broccoli, baked potatoes with skin, plums, pears, apples, greens, and nuts.
- If needed, you can also use over-the-counter fiber medications or laxatives.

## Returning to Work/School

Many factors affect your ability to return to work or school, including the type of job you have, how much lifting is required, and the extent of your operation. Your surgeon will work with you to determine a safe time for your return.

## Intimacy

You can have sex when you feel ready and your wound site has healed (usually 1 to 2 weeks postoperatively).

## Cancer Survivorship Plan

If your operation was needed for lung cancer, ask your doctor about a cancer survivorship plan. You can also refer to the survivorship plan in the front pocket.



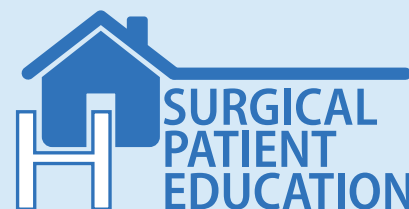
## Call your surgeon if you have:

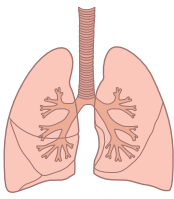
- Pain that gets worse or will not go away with pain medication
- Constipation for 4 days
- Worsening pain or swelling in your ankle or leg
- Continuous nausea or vomiting
- Urinary tract infection (pain when urinating or foul-smelling urine)
- A new skin rash
- Signs of infection
- Wound swelling, redness, drainage that soaks your dressings, or foul-smelling drainage
- A fever higher than 101 degrees Fahrenheit
- Signs of pneumonia
  - Coughing, fever, fatigue, nausea, vomiting, rapid breathing or shortness of breath, chills, or chest pain.
- If you run low on pain medication

## Call 911 or go to your local emergency room if you have:

- Sudden or sharp chest pain
- Shortness of breath and feeling like your heart is racing
- Continuously coughing up bright red blood
- Sudden numbness or weakness in arms or legs
- A sudden, severe headache
- Fainting spells
- Severe abdominal pain

## Partners in Your Surgical Care





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**Filming locations:** Northwestern Memorial Hospital, Northwestern University—Feinberg School of Medicine, Brigham and Women's Hospital, Washington University Medical Center, and Emory University Clinic

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**Questions?** Please contact the Division of Education Surgical Patient Education Program office at [surgpatiented@facs.org](mailto:surgpatiented@facs.org) or 312-202-5263.

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