



## ***Patient Education***

# **Lung Volume Reduction**

*For the treatment of emphysema*

## **General Information Booklet**



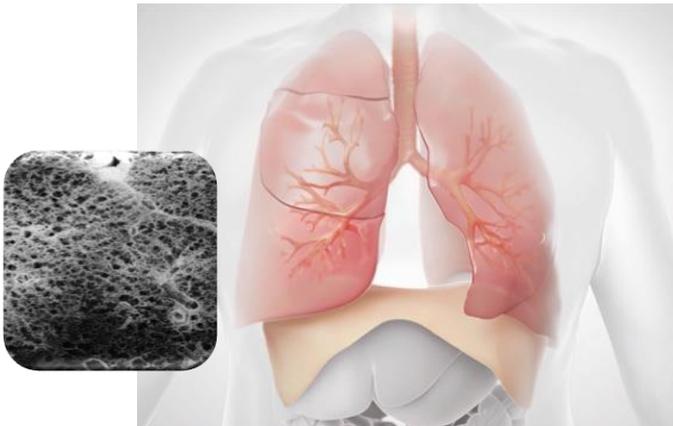
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## What is emphysema?

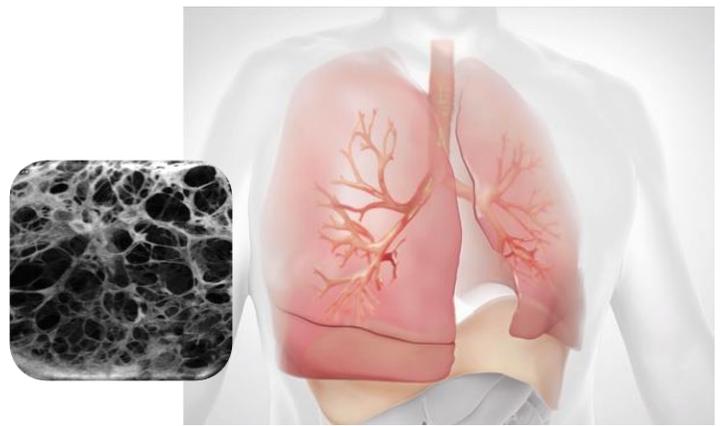
Emphysema is a serious disease afflicting more than four million people worldwide. It is one form of Chronic Obstructive Pulmonary Disease or COPD. Emphysema, is caused primarily by smoking, is characterized by the gradual, irreversible breakdown of lung tissue. This causes the lungs to lose the ability to move air in and out normally and to efficiently absorb oxygen. Eventually, breathing becomes labored as the damaged lungs trap air. As the disease advances, the damaged, inelastic areas of the lung progressively expand within the chest cavity, leaving the patient constantly feeling out-of-breath since there is insufficient room available for the lungs to function normally.

The most common cause of emphysema is cigarette smoking. To qualify for any procedure you must be smoke free for at least 6 months. Usual treatment for emphysema includes inhalers, pulmonary rehabilitation and oxygen. There is no known cure for emphysema but Lung Volume Reduction (LVR) may offer relief from the symptoms.



**Healthy Lung**

*Tissue is elastic with large surface area  
Breathing is easy; Lung expands and contracts normally*



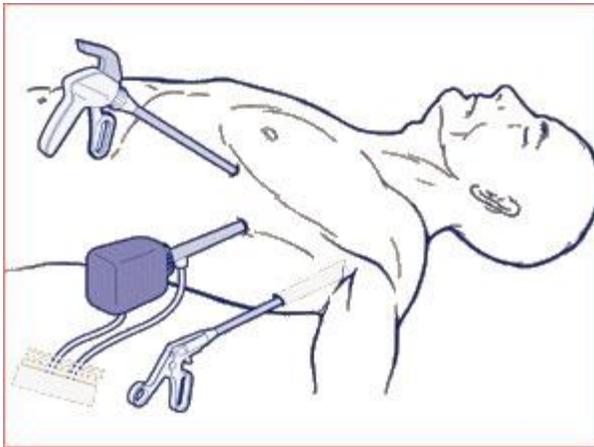
**Lung with Emphysema**

*Tissue destruction reduces elasticity and gas exchange  
Diseased area compresses healthier region, making breathing difficult*

## What is LVR?

Lung volume reduction (LVR) has been shown to offer relief to patients suffering from emphysema by either surgically removing the diseased portion of the lung or inserting valves in the most diseased portion of a lung. Both approaches can make the treated lung smaller which allows the remaining lung tissue to expand more fully and to function better. Both techniques for lung volume reduction (LVR) have been studied in clinical trials and been approved for the treatment of emphysema in selected patients.

## What is Lung Volume Reduction Surgery (LVRS)?



LVRS is an operation to remove the most damaged parts of both lungs. The damaged lung tissue is removed through a minimally invasive thoracoscopy. During a video-assisted thoracoscopic surgery (VATS) procedure, a tiny camera and surgical instruments are inserted between the ribs through small incisions. The purpose of the surgery is to remove the most damaged parts of your lungs (up to 30% of each lung) which will give the healthier areas room to expand.

NYP/Columbia was one of 17 centers in the nation participating in the largest study to date, National Emphysema Treatment Trial (NETT). Results from the trial show that LVRS may be beneficial in a select group of patients who meet established guidelines. The goal of the surgery is to:

- Reduce your shortness of breath.
- Increase your exercise capacity.
- Improve your quality of life.

It is important to remember LVRS is a complicated procedure that is being performed on patients with bad lung function with the hope that it will improve their symptoms. The success of the surgery depends on the location and amount of diseased tissue, as well as the patient's ability to tolerate surgery. Before surgery or any other new treatment is considered specific tests need to be done to determine if you will benefit from the surgery.

## What is Endobronchial Valve Placement?

The Lung Volume Reduction Program has participated in several studies involving new minimally invasive treatment options. The newest FDA approved device, the Zephyr valve, is used in endoscopic lung volume reduction therapy. The valve is placed in the airway to block off the damaged parts of the lung and reduce hyperinflation. This helps the healthier areas can function more efficiently. This novel procedure provides an alternative for some patients to surgery.

## How do you determine which treatment is right for me?

Our goal is to develop an individualized plan of care to optimize each patient's outcomes by offering the best possible treatment option. To do this you will need to have some testing:

### ***Baseline screening***

The evaluation begins with completion of the Emphysema Questionnaire and review of your medical information that was sent to us by your doctor. If you appear to be a candidate for LVR, you may choose to have more tests to further evaluate your eligibility. The evaluation is scheduled over 2 days and is done at the medical center. You are **NOT** admitted to the hospital for this and go home each day after the tests are finished.

### ***Required exams:***

- Full pulmonary function (PFT) testing with diffusing capacity (breathing tests).
- Arterial blood gas measure (blood taken from the artery in your wrist).
- High resolution and spiral chest computed tomography (CT) scan (a special X-ray of the lungs).
- Echocardiogram (a picture of the heart taken with an ultrasound device).
- Bicycle exercise stress test (you will ride a stationary bike; during the test you will wear a heart monitor, receive oxygen through a mask, and be observed by a physicist).
- Six-minute walk test (6MWT).
- Lung perfusion scan (measures the blood flow to your lungs).
- Cotinine urine level (a lab test to confirm that you do not smoke).
- Pulmonologist appointment: a lung specialist who will review your history, test results, current treatments and make recommendations.
- Coordinator appointment: a nurse that will educate you on LVR.

*\*If you have had any of these tests in the last six months, they may not have to be done again. Please contact the coordinator to discuss.*

## What do I need to do to prepare for these tests?

**PFT-** measures how well your lungs work and usually takes 60-90 minutes. Enclosed in your packet is instructions on holding your breathing medication before the test and please bring your inhalers with you to the test.

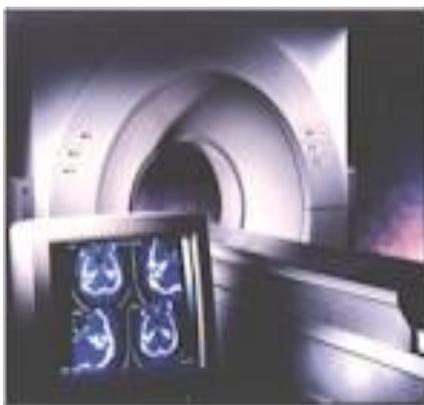


**Spirometry-** this measures the amount of air you breathe in and out. For this test, you'll sit in front of a machine and be fitted with a mouthpiece. You'll also wear a nose clip to keep you from breathing air out through your nose. The respiratory technologist will explain how to breathe for the test.

**Plethysmography-** this measures the volume of gas in your lungs. For this test, you'll sit in a small booth and breathe into a mouthpiece with a nose clip.



**Chest X-Ray-** is an imaging test that uses small amounts of radiation to produce pictures of the organs, tissues, and bones of the body. It can help spot abnormalities or disease of the airways, blood vessels, bones, heart, and lungs and usually takes about 10 minutes.



**CT Scan-** A computerized tomography scan uses computers and rotating X-ray machines to create images of the body. While the table slowly moves you into the scanner, the X-ray machine will rotate around you. You may hear clicking, buzzing, and whirring noises during the scan. The table will move a few millimeters at a time until the exam is finished. It's very important to lie still while CT images are being taken because movement can result in blurry pictures. The entire procedure may take about 15-30 minutes.

**Lung Perfusion Scan-** is a series of two lung scans that are performed together or one after the other and may take about 45-60 minutes. One of the scans measures how well air is able to flow through your lungs and the other shows where blood flows in your lungs.

A nurse will set up an intravenous (IV) line. A small amount of Radionuclide dye will be introduced into your bloodstream through the IV. After the dye has been injected the IV will be removed and you will then lie still on an exam table under a special scanner. This scanner will detect the dye and look at how it flows into your lungs.

For the air flow part of the exam you will be given a mouthpiece while you are still lying underneath the scanner. You will be asked to breathe through the mouthpiece, which contains a gas with a small amount of radioactive substance. The scanner will take images of your lungs while you are breathing in the gas.

**Oxygen Titration/Six Minute Walk Test (6MWT) -** A physical therapist clips an electronic device called a pulse oximeter to your finger, which measures how much oxygen is in your blood. Pulse oximeter readings are taken at rest and while walking on a treadmill to determine how much supplemental/additional oxygen you need to maintain a blood oxygen level of 90% or above.

Next, the therapist measures the distance you can walk quickly on a flat, hard surface in 6 minutes. This reflects your ability to perform daily physical activities. Please dress in comfortable clothing, wear walking shoes, use walking aid if you normal need one, and avoid exercise before the test. These tests will take about 45 minutes to perform.



**Cardiopulmonary Exercise Test-** measures how well the heart, lungs, and muscles are working individually, and how they work together. EKG electrodes will be placed on your chest to monitor you heart, your blood pressure will be taken before, during and after you exercise. A pulse oximeter will be placed on your finger to monitor your oxygen levels while you will ride a stationary bicycle. You will be monitored by a physicist and it should take about 60 minutes.

**Echocardiogram-** is a type of ultrasound that uses sound waves to produce images of your heart and gives information about the heart muscle, the heart chambers and structures within the heart. This exam will take 15-30 minutes and is performed by a technician.

**Blood and Urine Test-** blood to test for a genetic form of emphysema called, Alpha 1 antitrypsin deficiency. Urine cotinine to detect tobacco use.

## **I finished my 2 days of testing, what's next?**

If the team feels that you are an acceptable candidate for LVR you will be referred to a local outpatient pulmonary rehabilitation "rehab" program.

## **Pulmonary Rehabilitation**

The goal of rehab is to maximize your physical condition and breathing prior to surgery so that your recovery will go more smoothly. You will complete two to three sessions per week and at least 16-20 sessions of exercise before surgery. It is so very important that you continue to exercise after finishing your rehabilitation program or you will lose all of the benefit you have gained. Before you "graduate", the pulmonary rehabilitation staff will design for you a long-term plan of exercise. Many programs offer a "maintenance" plan so that you can continue to exercise with others with breathing problems.

### ***Exercise sessions***

During the exercise sessions, you may use stationary bicycles, treadmills, handheld weights or other exercise equipment. You will learn how to use the equipment, and about proper body mechanics and breathing techniques. Your blood pressure, heart rate, and blood oxygen level will be measured before, during, and after exercise. You will set goals with the help of the rehab staff to gradually increase your endurance and be given exercises to do at home on the days you do not attend classes.

## **Heart Testing**

While you are in pulmonary rehabilitation you will be scheduled for a Nuclear Medicine Stress Test.

If the heart tests show that you may have either high blood pressure in your lungs, or coronary artery disease (CAD), which is narrowing or blockage of the blood vessels to the heart, you may also need to meet with a cardiologist (heart doctor), and/or undergo a heart study called a heart catheterization.

## **Is lung volume reduction common? Is it widely available?**

LVR is a rare procedure that is only performed at select medical centers. LVR requires a team approach that can only be delivered by an experienced team of thoracic surgeons, pulmonologists, anesthesiologists, radiologists and nurses who specialize in complex lung disease.

The New York Presbyterian Hospital is home to one of the most respected thoracic teams in the nation that have vast expertise in LVR, lung transplantation, and several

other types of major lung procedures. *U.S. News & World Report* ranks our pulmonary program #8 in the nation, and #1 in New York.

## What are the risks of surgery?

Anyone who undergoes surgery is at risk for complications. Patients with emphysema are at a higher risk due to their lung disease. LVR is **not** a cure for emphysema. There will still be emphysema present in the remaining lung tissue, and we do not know how long the benefits of LVR will last. Ultimately, there is no guarantee that the surgery will work.

### Risks of LVRS *may* include:

#### Common:

- Pneumonia or other infections 6%
- **Prolonged air leak from the lungs or a collapsed lung (pneumothorax) 50%**

#### Rare:

- Heart attack, irregular heartbeats or stroke
- Bleeding requiring a blood transfusion or a return to the operating room.
- Stroke or blood clots.
- Prolonged need for the ventilator (the machine that breathes for you).
- Problems with the intestines (bowel) such as bleeding or obstruction.
- Long hospital stay.
- In rare cases death (since 2003 NYP has a 0.08% mortality rate).

Before surgery, you will meet with the pulmonary doctor and surgeon who will go over these risks with you in detail.

## What are the risks of valve placement?

#### Common:

- Air Leak (pneumothorax) - happens in 25-30% of the patients
- Pneumonia
- Worsening of Emphysema Symptom
- Coughing up Blood
- Shortness of BreathChest
- Pain or DiscomfortCough

#### Rare:

- Death- 6% was reported in the clinical trials and there has been 0% deaths since it has been FDA approved

## **What if I'm not a candidate for LVR?**

The pulmonologist may make recommendations regarding:

- Oral medications
- Antibiotics
- Bronchodilators and other inhaled medications
- Pulmonary rehabilitation program
- Oxygen supplementation
- Lung transplantation referral

## **How do I schedule the surgery or valve treatment?**

After you finish pulmonary rehab you will return for a final pre-procedure check which will include:

- Consent
- Preoperative testing-including: CPET, 6MWT, blood and urine test and
- LVR Appointment with the Interventional Pulmonologist or Surgeon within 30 days of scheduled procedure
- Nurse Coordinator

## **How long is the recovery for LVR?**

### **Surgery:**

The usual surgical hospital stay is 7 to 10 days. The first day or two is spent in the intensive care unit where you can be closely monitored for any complications. You will gradually resume eating, starting with liquids, and adding solid foods as tolerated. You may have an upset stomach (nausea), due to the anesthesia and pain medications. You will be given medications to help control the nausea. It may take several days for your bowels to work normally after surgery. You will start exercising as soon as possible after surgery. A physical therapist will help you walk and get out of bed as soon as possible and will show you exercises that you can do in your room. Moving around after surgery helps to prevent complications!

### **Valves:**

The usual hospital stay for the valve placement is 4 days and the procedure takes about 30-60 minutes.

## What is expected of me after I am discharged from the hospital?

### **Surgery:**

Your surgeon will want to see you in the clinic one to two weeks after you leave the hospital. You will not be allowed to drive for four to six weeks from the date of surgery or until you have stopped taking the narcotic pain medicine which may causes drowsiness. You will return to pulmonary rehab for exercise sessions after your surgery to help maintain your conditioning. Long term studies show that the patients who maintain benefit from LVRS for the longest period of time are those who exercise regularly. You will return to the hospital for a follow up 6 months after the surgery and yearly thereafter.

### **Valve:**

The usual hospital stay for the valve placement is 4 days. After valve placement you will be given a wallet-sized patient information card (patient ID card) that says you have one or more Zephyr Valve implants in your lung. It will also have the contact information of your doctor. Please keep this card with you at all times and show it to anyone who gives you medical care, including any emergency room medical staff. Please show your patient ID card to anyone who plans to perform an MRI scan.

You will continue to use the medicines that your doctor has prescribed for your severe emphysema.

After your airways recover from treatment, you will go back to your doctor for a checkup.

About 1 in 5 patients require an adjustment procedure. Zephyr Valves are removable. If you should require an adjustment procedure, one or more valves that have been previously placed are removed and replaced. During this procedure, your doctor may also place more valves as necessary to treat your lungs.



## What is a Health Care Proxy?

The New York Health Care Proxy Law allows you to appoint someone you trust — for example, a family member or close friend – to make health care decisions for you if you lose the ability to make decisions yourself. By appointing a health care agent, you can make sure that health care providers follow your wishes. Your agent can also decide how your wishes apply as your medical condition changes. Hospitals, doctors and other health care providers must follow your agent’s decisions as if they were your own. You may give the person you select as your health care agent as little or as much authority as you want. You may allow your agent to make all health care decisions or only certain ones. You may also give your agent instructions that he or she has to follow. This form can also be used to document your wishes or instructions with regard to organ and/or tissue donation. You should keep a copy of this document and give copies to your health agent, family and physicians.

*Chart 1: Test Schedule*

Test	Time required for test	Evaluation/Pre Pulmonary Rehab	Post Pulmonary Rehab/Pre-Operative Appt	Post-Surgery/ 6 month	Yearly - 10 years
Physician Exam	30 min	X	X	X	X
Oxygen Titration/ Six Minute walk	30 min.	X	X	X	X
ECG	20 min		X		
Blood and Urine Test	15 min	X	X	X	X
Pulmonary Function Test	60-90 min	X		X	X
Exercise Test/Bike	60 min	X	X	X	X
Written Survey	10-20 min		X	X	X
ECHO	30-60 min	X			
Chest X-ray	20-30 min	X			
Lung Scan/CT Scan	60-90 min	X			X

## Costs

The cost of such treatment will be billed in an ordinary manner to you or your insurance company. The cost beyond that paid for by your insurance, if any, will be your responsibility.

## Conclusion

LVR clearly has an important role in the treatment of patients with emphysema. However, it is important to remember that these are elective procedures that have been shown to be effective in a select group of patients and unsafe in other groups of patients.

It is our goal to provide you with the best care and best possible outcomes that is why the evaluation process with all its tests is so important. If you are accepted for LVRS or valve placement you will receive more specific information about the actual procedure and after care. We encourage you to write down your questions so we can answer them for you during your visit.

I have read the *Lung Volume Reduction General Information Booklet* given to me by the staff at the Center for Chest Disease.

I have been provided an opportunity to read the information and ask questions. I understand the information that has being provided to me.

### Questions?

***Your questions are very important. Our staff are available to help answer any questions or concerns.***

I understand that this confirmation of receipt of information will be placed in my chart and maintained in the Lung Reduction office.

### **Lung Volume Reduction Services**

**The Center for Chest  
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*Patient Signature*  
*Date*

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*Nurse Coordinator Signature*  
*Date*