

Endoscopic lung volume reduction

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This brochure provides you, and your family, with information concerning endoscopic lung volume reduction procedures at UZ Leuven and any support we can give you throughout the entire process. It is a useful guide you can refer to in the event of questions.

Your doctor will have told you that you qualify for an endoscopic lung volume reduction. No doubt you will have already been provided with a lot of information during your consultation, but it is not always easy to process such details and impressions in a short time.

The team in charge of your treatment has composed this brochure to give you the opportunity to digest all the information in your own good time.

Obviously, this brochure is not meant to replace conversations in person with the care providers, but it can provide additional information. Should you have further questions after reading this brochure, please do not hesitate to contact us. We would be happy to assist.

THE MULTI-DISCIPLINE TEAM

Our multi-discipline team will provide the best possible care throughout the entire process and will also focus on your general health. We will try to support you as much as possible before, during and after you operation.

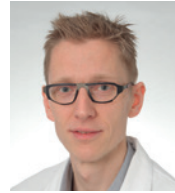
Team of physicians



Prof. Dr. Janssens
Pulmonologist



Prof. Dr. Verleden
Pulmonologist



Prof. Dr. Dooms
Pulmonologist



Dr. Everaerts
Pulmonologist



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Thoracic surgeon



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Project coordinator



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Endoscopy team

Els Putseys
Karine Candrix

Outpatient services

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Oranje straat, poort 1, niveau -1 (OR 1.-1)
016 34 34 81
- Functiemetingen 1 (endoscopy)s
Oranje straat, poort 7, niveau 0
016 34 34 79

Hospitalisation services

- Hospitalisatie 31 (pulmonology hospitalisation unit)
Gele straat, poort 2, niveau 5 (GE 2.5)
016 34 65 10

WHY DO YOU NEED A LUNG VOLUME REDUCTION?

Your doctor will have proposed that you have an endoscopic lung volume reduction to insert valves into the airways.

To understand why this is necessary, it is important to be aware how the lungs work.

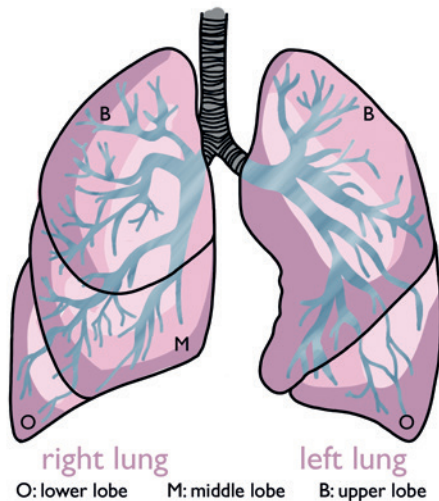
Organs or tissues cannot survive without oxygen.

Oxygen is used throughout the body to produce energy via chemical reactions that create carbon dioxide as a waste product, which has to be removed from the body. The exchange during which oxygen is absorbed from the air into the blood via the lungs, together with the carbon dioxide that needs to be exhaled, is referred to as 'gas exchange'. The lungs manage both processes for our entire body: both the absorption of oxygen and the discharge of carbon dioxide.

Normal lungs are soft and spongy. They consist of elastic tissue, which enables them to stretch. The right lung is divided into three lobes (the right upper, right middle and right lower lobe).

The left lung consists of two lobes (the left upper and the left lower lobe).

This division of lobes is due to the presence of fissures.



The right lung has 2 fissures: the horizontal fissure which separates the upper and middle lobes from the lower lobe and the oblique fissure which separates the upper and middle lobes. The left lung consists of an upper and lower lobe separated by the oblique fissure. This is clearly shown in the illustration on page 6.

The lungs contain several bronchi, which are similar to tree branches. Each branch divides and branches off into smaller and smaller segments, thus creating more and more bronchioles. The smallest bronchioles end in small alveoli, or air sacs, in which the gas exchange occurs. Chronic obstructive pulmonary disease (COPD) leads to both narrowing of the small airways and the gradual destruction of the tiny air sacs. This is referred to as lung emphysema. Adjacent tiny air sacs interconnect resulting in larger spaces filled with air that can no longer assist with the gas exchange and disrupt the proper functioning of the lungs.

healthy lung alveoli



lung emphysema



Large air chambers are created in the lobes of the lungs that can no longer be emptied when a person exhales. These chambers take up significant space in the thorax cavity and push down the diaphragm. This is referred to as lung hyperinflation, which means that the diaphragm, the main breathing muscle, can no longer function properly. Result: difficulty breathing in and severe shortness of breath, particularly during exertion but sometimes also when at rest.

With severe lung emphysema current medication is often not sufficient to keep the symptoms under control and prevent further deterioration. In such cases we investigate whether patients qualify for additional treatment such as a lung transplant or lung volume reduction. The latter can be performed with an operation or by inserting small valves into the airways. Following a referral from your pulmonologist, a multi-discipline team will decide on the basis of your specific tests and disease profile whether one of these treatment options is feasible.

TREATMENT WITH VALVES

NATURE OF THE INTERVENTION

When an endoscopic lung volume reduction is performed, the physician will insert one-way valves into the airway branches that lead to the most diseased lung lobe. These tiny valves prevent air from entering this part of the lung when a person breathes in. Air can still flow out of this lung lobe so that it will gradually close.

This means that the healthier parts of the lungs can take up the space that is released and the diaphragm, the main breathing muscle, is giv-

en more space to breathe in air. This in turn will result in an increase in lung volume, fewer symptoms and a better quality of life.



WHO QUALIFIES?

With each patient we investigate, as part of a multi-discipline team, whether they qualify for this procedure. Patients who meet the following criteria may qualify:

- ✓ Patients with severe lung emphysema on the basis of lung function and a scan.
- ✓ Patients who continue to suffer severe symptoms despite consistently sticking to their therapy.
- ✓ Patients who have stopped smoking for at least 6 months.

Our task is to provide you with detailed information concerning the benefits and risks associated with an endoscopic lung volume reduction, to enable you to make a carefully considered decision. If we propose this treatment, it is up to you to decide whether or not you want to go ahead with it. We will respect your decision at all times.

WHAT KIND OF RESULTS CAN YOU EXPECT?

We will only treat patients for whom we expect the operation to be successful. We do know (based on international experience and studies) that approximately 30% of patients do not see any improvement in their lung function and symptoms.

RESULTS	Likelihood of improvement in:	
	Lung volume	70%
	Exercise capacity	55%
	Quality of life	70%

EXAMINATIONS

The following examinations will be performed prior to the intervention:

Blood and urine tests	Blood and urine samples to determine various values.
Arterial puncture	Blood sample taken via the artery in the wrist to determine the amount of oxygen and carbon dioxide in the blood.
Questionnaires	You will be asked to complete a questionnaire to enable us to collate additional information about the impact of your disease on your day to day activities. This will give us a better insight into your illness perceptions.

Thorax CT scan	An examination using X-rays to produce images of your lungs. A CT scan provides more details than traditional radiographic images.
Ventilation/perfusion scan	The patient inhales a gas and is injected with a tracer so that we can gain an insight into the circulation and airflow in the lungs.
Echocardiography	Echography of the heart to gain an insight into the functioning of the heart and the impact of COPD on the heart using sound waves.
Lung function	Measuring of lung volume, volumes of air in the lungs and gas exchange.
6 minute walk test	We test your exercise capacity using a walk test during which you try to cover as much distance as possible in the space of 6 minutes.
Bronchoscopy	To look inside the airways using an endoscope, which is a thin flexible tube fitted with a video camera. The endoscope is inserted via the mouth.
Chartis measurement	A system specifically developed for this purpose is used during a bronchoscopy to test whether the fissures (separations between the lung lobes) are intact.

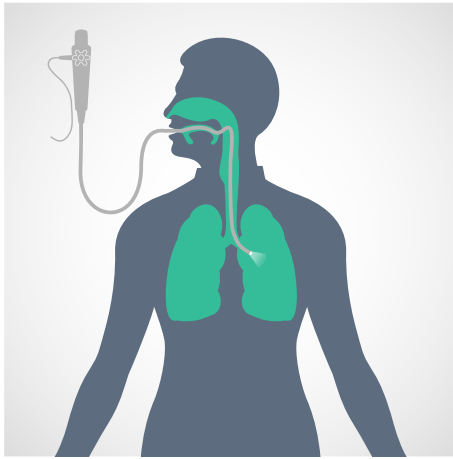
Preoperative anaesthesia consultation In view of the fact that this operation is performed under a general anaesthetic you will have a prior consultation with an anaesthetist. Examinations include an ECG and blood sample. During the consultation we will also discuss which medication you should stop taking prior to the operation.

ADMISSION AND INTERVENTION PROCEDURE

DAY 1

The day before the treatment you will be admitted to the pulmonology hospitalisation unit Hospitalisatie 31. You may have to undergo a number of further examinations on this day (a walk test, lung function, X-ray of the lungs, echocardiogram of the heart). A blood sample will also be taken at the nursing unit. You will have to fast from midnight, i.e. you cannot eat or drink anything.

DAY 2 – DAY OF THE OPERATION



You will be taken to the endoscopy unit. You must have fasted beforehand, but you can still use your inhalation therapy (puffers). At the endoscopy unit you will be introduced to the anaesthetist, who will make the necessary preparations for the anaesthetic. A drip will be inserted into your arm to administer the anaesthetic.

Based on the examinations performed prior to your admission two options will be available, both under general anaesthetic and ventilation.

- 1 We immediately insert a number of tiny valves into the most diseased lung lobe. On average 3 to 5 valves are required to make the selected lobe close. You will now be hospitalised for 4 to 5 days. In very exceptional cases, if there are abnormalities in the airways or there is a suspicion of infection, a decision will be made not to insert valves.

- 2 We first perform a Chartis measurement to establish whether the fissures (separations between the lobes) are intact. During this procedure, a balloon catheter is inserted into the airway to measure whether there is any airflow. If the fissures appear completely intact the tiny valves, we refer to it as collateral ventilation or an air leak. If that is the case no valves will be inserted because this would never result in the lung lobe closing.

If you do not qualify for the insertion of valves, you will be able to leave the hospital on the same day. Remember to organise transport because you will not be allowed to drive following the general anaesthetic.

We will then reassess your dossier and look at other options including lung volume reduction surgery, i.e. an operation during which the most diseased parts of the lung are removed. In that case this approach will be discussed with you in more detail at the appropriate time.

Once you have woken up, we will take you to a recovery room. If valves were inserted, an initial lung X-ray will be performed before you return to your room. Providing your lung hasn't collapsed you can go back to your room.

The coordinator or pulmonologist will visit you in the afternoon to provide more details about the treatment. Because of the risk of a collapsed lung it is important that you take it easy during the first 48 hours and remain in your room. You can visit the toilet and change positions, e.g. to eat. You will also be given cough suppressant medication and mild laxatives to prevent you from have to apply pressure when visiting the toilet.

DAY 3

The following morning we will take another X-ray of your lungs. You will still not be able to leave your room or make strenuous efforts. A member of our team will visit you.

DAYS 4 - 6

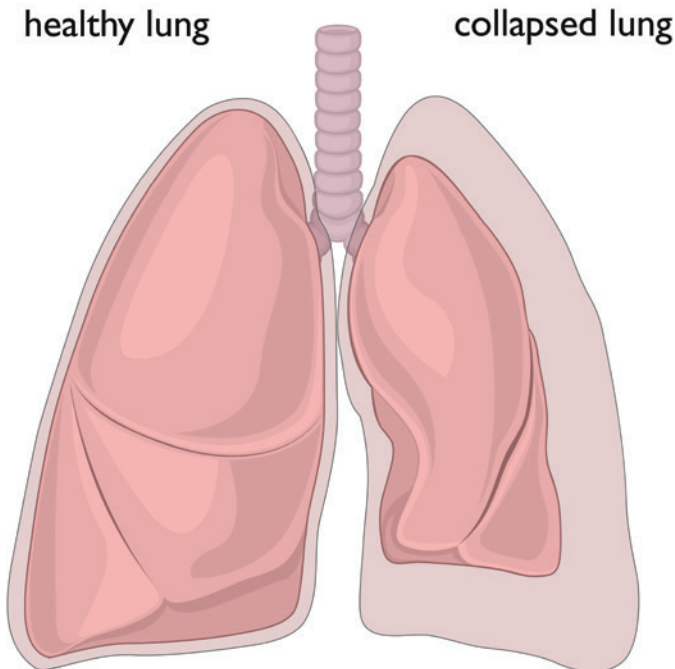
Lung X-rays will be taken every day. From now on you can move around more and, for example, take a brief walk in the corridor. The first few times under supervision of a nurse or physiotherapist. During your admission it is important that you report pain in your chest or sudden shortness of breath.

Before you are allowed to go home the physiotherapist will assist you when walking in the corridor and up the stairs. Providing this goes smoothly, without complications, you will be allowed to go home. Prior to being discharged from hospital the pulmonologist will visit you for a final time. You will also be given any follow-up appointments when you go home.

POTENTIAL COMPLICATIONS AND PROBLEMS

COLLAPSED LUNG

Once the tiny valves have been inserted there is a risk of developing a collapsed lung (=pneumothorax). It is estimated that this occurs in 10 to 20% of patients treated with valves. In such cases the less diseased lung lobe will quickly take up the space of the lung lobe we have closed. Because this process happens so quickly it can lead to a tear in the healthier lung lobe. The air accumulated between the lung and pleura then leads to a collapsed lung.



A collapsed lung can be treated quickly by inserting a tube (=drain) into the chest cavity under local anaesthetic. A collapsed lung does not have an adverse impact on the eventual outcome of the operation, but you will have to remain in hospital a bit longer.

The risk of a collapsed lung is the highest during the first few days after the insertion of the valves. That is why you have to stay in hospital for a few days and cannot make any strenuous efforts during the first 48 hours.

PROBLEMS IN THE SHORT TERM

The collapse of a lung lobe may coincide with pain when breathing, a painful or pulling sensation in the chest and back and/or shoulder blades, a cough and a temporary worsening of shortness of breath. The latter is due to the fact that the circulation in the treated lung lobe needs time to adjust to the new situation. The measured oxygen values may consequently be slightly lower than normal, which is why you may be given additional oxygen via a nasal cannula during your stay in hospital. Moreover, you may also notice tiny amounts of blood in any mucus coughed up for a number of days.

INFECTION

Sometimes the airways may become infected in reaction to the valves or because of the presence of bacteria in the airways. This will be treated with antibiotics.

DISCHARGE FROM HOSPITAL

Providing there are no complications, you will be able to leave hospital after 4 to 5 days. Our doctors and nursing staff will make all the necessary preparations for your discharge.

This includes the following discharge forms:

- ✓ A letter for your GP with a brief, preliminary report concerning the operation and your stay in hospital.
- ✓ A letter addressed to you indicating which medication you need to take.
- ✓ If necessary, we will provide a prescription for the pharmacist.
- ✓ A summary of planned follow-up appointments.

If you require other forms (e.g. for the insurance, health insurance fund or your employer), please ask the nurse or junior doctor in good time so that we can complete them and hand them over when you are discharged.

THINGS TO REMEMBER FOLLOWING YOUR DISCHARGE FROM HOSPITAL

DRIVING

It is advisable not to drive during the first week after your discharge from hospital.

EXERTING PRESSURE

During the first 2 weeks you should avoid any undue pressure on your chest, i.e. intense coughing, pushing, lifting, strenuous efforts or a lung function test. Carrying heavy objects and strength exercises involving the arms or chest muscles are not advisable during the first month. Also consult your physiotherapist about this. Try to maintain a healthy diet and drink enough water to maintain a regular bowel habit. You may be prescribed medication to be taken daily to ensure that your stools remain soft and to prevent constipation.

REHABILITATION/SPORT

Two weeks after the treatment you can recommence your rehabilitation programme. Avoid strength exercises involving your arms, chest and shoulders during the first 4 weeks though. You can continue condition training and building up the muscle strength in your legs. However, you should not aim to discover the limits of your efforts during this period. This could aggravate potential complaints. After 4 weeks you can resume your original training regime.

COUGH SUPPRESSANT MEDICATION

You will be given cough suppressant medication during your stay in hospital. This may have to be continued, depending on your specific complaints, up to 1 week after you have been discharged.

PAIN

In the event of severe pain coupled with severe shortness of breath, you should go to the nearest accident and emergency unit. If you are on your own and feel quite ill, call an ambulance.

These may be symptoms of a collapsed lung that will require rapid intervention. Moreover, you, or your family, should contact us as soon as possible.

LUNG VOLUME /LUNG FUNCTION TEST

A lung function or lung volume test should not be performed during the first 4 weeks after the insertion of the valves. If a lung volume test is being planned during these 4 weeks, remember to notify the doctor in charge of the treatment that it must not be performed because of the recent insertion of the valves.

FLYING

If you intend to fly in the months ahead, you should first consult one of the pulmonologists of the multi-discipline team. In any case, flying is prohibited during the first 4 weeks after the treatment.

MAGNETIC (MRI) SCAN

A patient fitted with valves in the airways can have an MRI scan providing the strength of the static magnetic field is on or below 3 Tesla.

LOW DOSE CT SCAN

Four to six weeks after the insertion of the valves a CT scan will be performed during a check-up. This will enable us to verify whether the valves are still in the correct position and whether there has been an impact on the treated lung lobe.

FOLLOW-UP

After 3 to 6 months, a number of tests (lung volume test, walk test, etc.) will be repeated to assess the impact of the treatment. You will be given any necessary appointments when you are discharged from hospital. Thereafter we will arrange annual check-ups here and any intermediary assessments will be managed by the pulmonologist dealing with your treatment.

PRACTICAL INFORMATION

- ✓ Remember to bring any medication you take at home, including your inhalation therapy (puffers).
- ✓ Your family will be able to call you directly. The nursing staff will give you the telephone number for your room.
- ✓ Bearing in mind that you need to stay in bed and rest for the first 48 hours, it is advisable to bring something to occupy your mind, e.g. a book, tablet, music, crosswords etc.
- ✓ You can take personal items such as pyjamas, slippers, toiletries, etc. to the pulmonology hospitalisation unit Hospitalisatie 31.
- ✓ Visits are possible every day at set times at Hospitalisatie 31:
 - Weekdays: from 16:00 to 20:00
 - Weekends: from 14:00 to 20:00
- ✓ Should you have questions or comments you can always contact the project coordinator, Hannelore Geysen, on 016 34 47 01 or via hannelore.geysen@uzleuven.be

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