PROCEDURE

# Open lung biopsy

An open lung biopsy is surgery to remove lung tissue for laboratory testing

**PURPOSE**
Obtain lung tissue for laboratory diagnosis

**PROCEDURE TYPE**
Diagnostic surgery through an incision between the ribs

**WHERE IT IS DONE**
Operating theatre

**ANAESTHESIA**
General anaesthesia

**HOW LONG IT TAKES**
About one to two hours

**PREPARATION**
Fasting and medicine adjustments, especially blood thinners

**RECOVERY**
Several hospital days; no driving while taking opioid pain medicines

**MAIN RISKS**
Bleeding, infection, persistent air leak, breathing complications

**RESULTS**
Initial findings after surgery; laboratory results usually within several days

## Overview

An open lung biopsy is an operation to remove a small piece of lung tissue. A specialist called a pathologist examines the tissue under a microscope. It may also be tested for infection, scarring, cancer, or other changes.

"Open" means the surgeon reaches the lung through an incision between the ribs. This approach is also called a thoracotomy. It is different from video-assisted thoracoscopic surgery, or VATS, which uses a camera and several smaller cuts.

An open biopsy provides a larger tissue sample than a needle or bronchoscopic biopsy. However, it is major surgery and usually requires several days in hospital. It is generally considered when less invasive tests cannot provide enough information or are unsuitable.

## Why the procedure is performed

Your healthcare team may recommend an open lung biopsy when scans, blood tests, breathing tests, or smaller biopsies have not explained an abnormal lung finding.

It may be used to investigate:

The operation should have a clear purpose. Before consenting, ask what question the biopsy is intended to answer and how the result could change your care.

- Widespread inflammation or scarring, including suspected interstitial lung disease
- A lung lump or area that could not be diagnosed another way
- An unusual infection that has not been identified through other tests
- Lung changes where the exact diagnosis would affect treatment

## Who should and should not have it

An open lung biopsy may be appropriate if a reasonably large tissue sample is needed and the expected information is likely to guide treatment. Your case may be discussed by a team that includes lung specialists, radiologists, surgeons, and pathologists.

It may not be the right choice if a bronchoscopy, needle biopsy, VATS biopsy, or follow-up scan can answer the same question with less risk. It may also be avoided if the result would not change your treatment.

The procedure may be delayed or reconsidered if you have an unstable heart or breathing condition, a significant untreated bleeding problem, or medicines that cannot yet be adjusted safely. Previous chest surgery, extensive scar tissue around the lung, or very limited lung function may make surgery more difficult.

These factors do not automatically rule out a biopsy. The surgeon and anaesthesia team assess your individual risks and the likely benefit of obtaining tissue.

## How to prepare

Follow the treating facility's instructions, because its own instructions take priority over general information.

You will usually have a preoperative assessment. This may include blood tests, an electrocardiogram to check your heart rhythm, breathing tests, and a review of recent chest

scans.

Tell the team about all medicines, vitamins, supplements, allergies, and previous reactions to anaesthesia. Blood thinners and medicines that affect clotting may need special planning. Do not stop a prescribed medicine unless your treating team tells you to do so.

You will be told when to stop eating and drinking before surgery. Smoking can affect wound healing and lung recovery, so tell the team if you smoke and would like support to stop.

Plan for someone to take you home after discharge and help during early recovery. Bring comfortable clothing that does not press on the incision.

## What happens during the procedure

You receive general anaesthesia, so you are unconscious and do not feel the operation. A breathing tube supports your breathing. The anaesthesia team monitors your oxygen level, blood pressure, heart rate, and other vital signs.

You are usually positioned on your side. The surgeon makes an incision on the side of your chest and carefully opens a space between the ribs. In some operations, the ribs must be spread to reach the lung.

The surgeon removes one or more tissue samples from the chosen area. The lung is checked for bleeding and air leakage. A flexible chest tube is usually placed through the chest wall to drain air and fluid while the lung expands.

The incision is closed with stitches, staples, or surgical adhesive. You then move to a recovery area. Some people need closer monitoring in a high-dependency or intensive care unit, particularly if they had serious breathing problems before surgery.

## Recovery and what to expect afterward

Pain: Chest and shoulder soreness are expected, especially with coughing, deep breathing, or movement. Pain relief may be given through tablets, an intravenous line, a nerve block, or an epidural near the spine. Tell the hospital team if pain prevents you from breathing deeply or walking.

Eating: You may begin with fluids and return to regular food as nausea settles and your care team allows. Constipation can occur after surgery, especially with opioid pain medicines and reduced activity.

Activity: Nurses and physiotherapists will help you sit up and walk as soon as it is safe.

Deep-breathing exercises and supported coughing help expand the lung and clear mucus. The chest tube stays in place until drainage is acceptable and there is no important air leak. Avoid heavy lifting until the surgeon says the chest wall has healed sufficiently.

Driving: You cannot drive home. Do not drive while taking opioid pain medicines or until you can turn comfortably, wear a seat belt, and perform an emergency stop without hesitation. Follow the surgeon's specific restriction.

Work: Returning to work usually takes longer than after a needle or keyhole biopsy. Timing is based on healing, pain control, your lung function, and whether your job involves lifting or physical work. Your surgical team can give you a more personal estimate.

## Risks and possible complications

Your team will explain how the risks apply to you. Possible complications include:

General anaesthesia also has risks, including reactions to medicines and heart or breathing complications. Some people need oxygen or breathing support after surgery. Rarely, severe complications can be life-threatening.

- Bleeding that may require treatment or another operation
- Infection of the wound, chest, or lung
- Air leaking from the lung longer than expected
- Part of the lung not fully expanding
- Pneumonia or worsening breathing problems
- Blood clots in a leg or lung
- An abnormal heart rhythm
- Ongoing numbness or pain around the incision

## Results and follow up

The surgeon may tell you what was seen during the operation, but appearance alone usually cannot provide a final diagnosis.

A pathologist examines the tissue. Results may describe inflammation, fibrosis or scarring, infection, a noncancerous change, or cancer. Special stains, cultures, genetic tests, or expert review can take longer than the initial examination.

Ask when and how you will receive the result. A follow-up visit usually covers the pathology report, wound healing, breathing, and the next steps. If cancer is found, further testing may be needed to identify its type and plan treatment. If a scarring lung disease is suspected, the result is often interpreted alongside scans and clinical findings by a specialist team.

## Alternatives

The alternatives depend on what your team is trying to diagnose.

CT scan follow-up avoids an immediate invasive procedure. It can show whether an area changes over time, but it may delay a definite diagnosis and cannot identify every cause.

Bronchoscopy passes a flexible camera through the mouth or nose into the airways. Samples can be collected without a chest incision, but they are usually smaller and may miss abnormalities away from the airways.

CT-guided needle biopsy places a needle through the chest wall using scan guidance. Recovery is shorter, but the sample is smaller and may not be enough for some widespread lung diseases. It can also cause an air leak.

VATS biopsy uses a camera and small incisions. It generally causes less chest-wall injury than open surgery, but it still requires general anaesthesia and a chest tube. Scar tissue or the location of the abnormal area may prevent its use.

No biopsy or treatment based on the most likely diagnosis avoids surgical risk. The trade-off is greater uncertainty and the possibility of receiving treatment that does not address the actual condition.

## When to call your healthcare team

Contact your surgical team promptly if you have increasing redness, warmth, swelling, drainage, or opening of the incision. Also call about a fever, worsening cough, increasing breathlessness, pain that is getting worse rather than better, or pain medicine side effects that you cannot manage.

Seek urgent medical advice for new swelling or pain in one leg, coughing up more than a small streak of blood, or a sudden decline in your breathing.

Call emergency services for severe difficulty breathing, blue or grey lips, fainting, confusion, heavy bleeding, or sudden severe chest pain. These are different from routine postoperative soreness and should not wait for a scheduled appointment.

## Common questions

Will I be asleep?

Yes. An open lung biopsy is performed under general anaesthesia. You will be unconscious, and a breathing tube will support your breathing during the operation.

Can I drive home?

No. You will remain in hospital after surgery and need someone else to take you home when discharged. Driving can resume only after your surgeon's restriction has ended and you can control the vehicle safely.

How painful is it?

A thoracotomy can cause significant soreness because the incision passes between the ribs. Pain relief is provided, and the discomfort should gradually improve. Good pain control helps you breathe deeply and move safely.

When will I know the results?

The surgeon may provide an initial update after the operation. The pathology result usually takes several days, while cultures or specialised tests may take longer.

Why am I having open surgery instead of keyhole surgery?

Open surgery may be chosen because of the sample location, previous surgery, scar tissue, or the amount of tissue needed. Ask your surgeon which specific factor applies to you.

Will I have a chest tube?

Usually, yes. It removes air and fluid and helps the lung stay expanded. It is removed when the team is satisfied that the lung is stable and drainage is acceptable.

## Sources

- American Thoracic Society. "Surgical Lung Biopsy." American Journal of Respiratory and Critical Care Medicine , Patient Education Series, 2016.
- MedlinePlus Medical Encyclopedia. "Lung biopsy." U.S. National Library of Medicine.
- Pulmonary Fibrosis Foundation. "Surgical Lung Biopsy Position Statement." 2019.
- National Institute for Health and Care Excellence. "Idiopathic pulmonary fibrosis in adults: diagnosis and management." Clinical guideline CG163, updated 2017.
- Cleveland Clinic. "Lung Biopsy: Types, Purpose, Procedure, Risks and Results."