Healthcare Improvement Scotland | SHTG Advice on health technologies

Plain Language Summary

Robotic-assisted bronchoscopy (RAB) for diagnosing lung cancer | May 2026

What is our advice to NHSScotland?

Robotic-assisted bronchoscopy (RAB) should be one of the biopsy options offered to people who have lung changes on a CT scan that could be cancer. RAB is especially helpful for people with small lung nodules (less than 20 mm) in the outer parts of the lung that can be difficult to reach with standard biopsy methods. For these nodules, RAB should be the preferred way to take a sample.

Everyone in Scotland who is suitable for RAB should have fair and equal access to RAB, no matter where they live. To introduce RAB safely, clinicians will need full training in how to use the equipment. Hospitals will also need the right facilities to clean, sterilise and check RAB bronchoscopes regularly.

When RAB is used, services should routinely collect and analyse data on how it works. This information will help shape future decisions about the role of RAB in Scotland's lung cancer diagnostic pathway.

What is lung cancer?

Lung cancer happens when cells in the lung grow in an abnormal and uncontrolled way. These cells form a lump, often called a nodule or tumour.

Lung cancer is easier to treat when it is found early. That is why tests are important if a scan or symptoms show something unusual in your lungs. Many lung changes are not cancer. Getting a clear diagnosis helps you and your doctors make the right decisions about what treatment, if any, you need.

What is robotic-assisted bronchoscopy?

RAB is a test that helps doctors find out whether a lung nodule or abnormal area seen on a CT scan is cancerous. RAB allows doctors to reach small nodules or difficult-to-access parts of the lung. It uses a thin, flexible tube called a bronchoscope, which is guided by a robotic system. The doctor controls the robot from a console and can move the bronchoscope very precisely.

During the test:

- the bronchoscope goes through your mouth and into your lungs
- a tiny camera on the bronchoscope shows detailed pictures of your airways
- the doctor takes small tissue samples (biopsies) using tiny tools passed down through the bronchoscope.

RAB helps doctors:

- reach small lung nodules that other methods may not reach
- collect tissue samples to make a clear diagnosis
- guide the bronchoscope steadily and safely.

You will have a general anaesthetic for RAB, so you will be asleep and will not feel anything during the procedure. Most people go home the same day.

RAB is not currently available in NHS Scotland.

Why is this important?

Lung cancer is the most common cancer in Scotland. Most people in Scotland are diagnosed with cancer at a late stage which is harder to treat and often not curable.

Finding lung cancer earlier makes a big difference. When it is found at stage I, almost 65% of people live at least 5 years. At stage II, about 40% of people live for at least 5 years.

To diagnose lung cancer, doctors usually need a biopsy. Conventional biopsy methods cannot always reach small nodules (less than 20 mm) or nodules near the edges of the lung. If people cannot get a definite biopsy result, they may feel anxious, have their disease progress or receive unnecessary treatments.

From 2027, Scotland plans to introduce lung cancer screening. Screening will find more small nodules earlier, meaning more people will need biopsies for nodules that standard techniques cannot easily reach. RAB may help doctors to biopsy these small or hard-to-reach nodules more reliably.

What we did

We looked at the published research on RAB, including:

- how well it works
- how safe it is
- how patients feel about it.

We carried out an economic analysis to understand if RAB is good value for the NHS in Scotland. The Roy Castle Lung Cancer Foundation shared patients' views and experiences with us.

What we found

Effectiveness and safety

A review of 27 studies (2,315 patients) found that RAB gave a clear diagnosis in about 87% of people with nodules near the edge of the lung. Around 2% had a collapsed lung (pneumothorax*) after RAB.

Another review (37 studies, 4,285 patients) compared RAB with several other tests for lung cancer. It found no differences in how often each test gave a clear diagnosis. Only three RAB studies (242 patients) were included and the patient groups were not truly comparable. This makes the comparisons uncertain, so we should be cautious about drawing firm conclusions from this review.

Five studies compared the Ion™ RAB system with other biopsy tests. The patient groups in these studies may not be directly comparable because people who are suitable for RAB are often not suitable for the other methods of biopsy.

- RAB versus electromagnetic navigation bronchoscopy (ENB).

  One large study (411 patients) found no meaningful difference between the two tests. Two smaller studies (92 patients and 116 patients) found RAB gave a clear diagnosis more often than ENB. Pneumothorax occurred in about 2% of patients in both groups in two studies; none occurred in the third.

- RAB versus virtual bronchoscopic navigation (VBN)

  In a study of 59 patients, RAB gave a clear diagnosis more often than VBN. Pneumothorax happened in about 7% of VBN patients and none of the RAB patients.

- RAB versus CT-guided transthoracic biopsy (CTTB)

  In a study of 296 patients, both techniques provided a clear diagnosis for a similar proportion of patients. Pneumothorax was much more common with CTTB than with RAB.

Patient views

The Roy Castle Lung Cancer Foundation shared that:

- Lung cancer causes serious symptoms and greatly affects daily life and emotional wellbeing.
- There is an unmet need for patients who have small or hard-to-reach nodules that current biopsy tests cannot sample.
- Being placed on a 'watch and wait' list (sometimes for up to 3 years) can cause anxiety.
- RAB requires a general anaesthetic rather than sedation, but some patients prefer this.
- RAB offers patients hope for getting a clear diagnosis sooner.

People living in the most deprived areas of Scotland are about three times more likely to develop and die from lung cancer than people living in the least deprived areas. Factors such as ethnicity, sex, age, and smoking status all increase the risk of late diagnosis of lung cancer.

Implementing RAB

Clinicians in the NHS will need proper training in how to safely and effectively use RAB.

Hospitals will need the right facilities to clean, sterilize and quality check the reusable RAB scopes on an ongoing basis.

Value for money

We conducted an exploratory economic analysis that suggested that RAB is likely to be good value for the NHS. The results were similar when we tested different assumptions in our analysis. Since there is not enough direct comparison data yet, our analysis relied on assumptions, so the results should be treated as indicative (a best estimate) for now.

**A pneumothorax or collapsed lung is an expected complication associated with taking biopsies from the lungs and can often be resolved quickly.*

What SHTG considered when developing advice for NHSScotland

1. A clinical expert told the Council that studies comparing RAB with standard biopsy methods often included different groups of patients. People with very small lesions on the edge of the lung usually cannot have a biopsy using standard techniques but could have a biopsy with RAB. This means the groups in the studies were not truly comparable.

2. The Council recognised that the evidence on RAB is hard to interpret because different studies used different definitions of 'diagnostic yield' (how often the test gives a clear diagnosis). A clinical expert explained that international groups have recently agreed on a strict definition, which should make the results of newer studies more consistent.

3. Some parts of the economic analysis had to be kept confidential and this meant that Council members felt it was impossible to judge whether the analysis was fair or reliable. Because of this, the Council agreed that our economic findings should be treated as exploratory or indicative, not definitive.

4. A clinical expert and a patient representative explained that people with small lung nodules (less than 20 mm) are often placed on a 'watch and wait' list. They usually get CT scans at 3 months, 1 year, and 2 years, and they are discharged after 3 years if the nodule does not change. If the nodule grows, patients may start treatment for cancer without a confirmed diagnosis, because a biopsy was not possible. This situation causes significant anxiety, distress and confusion for patients and their families.

5. The Council recognised that RAB is particularly important for patients who cannot have a timely biopsy using standard methods. A presentation from the Roy Castle Lung Cancer Foundation highlighted how crucial this is for many people.

6. The Council noted that Scotland currently does not have a lung cancer screening programme or access to RAB, both of which are available in England. They agreed that this creates an unfair difference in healthcare access for people at high risk of lung cancer across the UK.

7. The Council discussed the planned national lung cancer screening programme for Scotland, due to start in late 2027. This programme is expected to identify more people with small lung nodules that need a biopsy. The Council were concerned that without RAB in place, services could become overwhelmed, leading to longer waits for diagnosis.

8. The Council considered how many RAB systems NHS Scotland might need and noted that RAB devices do not need to be in every hospital. They acknowledged that each centre using RAB would need to perform a minimum number of procedures to maintain staff skills and ensure safe, high-quality care.

9. The Council discussed the value of collecting and analysing Scottish RAB data, so it can be compared with information from England and Europe. This would help monitor performance, improve services, and support future decision-making.

What next?

The NHSScotland National Infrastructure Board will use our advice to decide whether to introduce RAB to support lung cancer diagnosis across Scotland.

This plain language summary has been produced based on an SHTG Recommendation: Robotic-Assisted Bronchoscopy (RAB) for diagnosing lung cancer