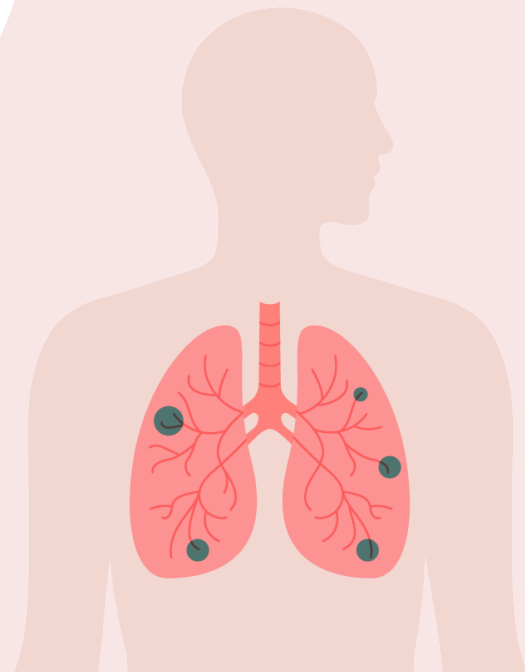


Recommendations from the Royal College of Pathologists of Australasia and the Thoracic Oncology Group of Australasia for Molecular Testing of Lung Cancer, 2025



Molecular Testing of Lung Cancer in Australia

Plain Language Summary

Molecular Testing for Lung Cancer: What You Should Know

When someone is diagnosed with lung cancer, special testing of the lung tissue sample called molecular testing (or biomarker testing) may be done. This is in addition to the microscopic study of the tissue and cells that are done to diagnose lung cancer. Molecular testing aims to find relevant changes in cancer cells (not normal cells), such as alterations in genes (DNA) or proteins, to help doctors identify which treatments are most likely to work for a person. These altered genes and proteins drive the growth of a cancer and can be blocked by some specific drugs. There are multiple types of tests available and different ways to do the testing that identifies the molecular alterations.

An expert group of lung cancer medical specialists comprising pathologists (who diagnose lung cancer and molecular alterations) and oncologists (who treat lung cancer patients with medicines) as well as patient representatives have developed recommendations for molecular testing in lung cancer to help navigate this complex process.

These recommendations include guidance on:

- **Which molecular tests should be performed** based on the type and stage of lung cancer.
- **When to perform molecular tests** to ensure treatment starts as soon as possible, to give the best possible outcomes for each person.
- **How to perform molecular tests** to maintain high-quality results.

Following these recommendations can help ensure that patients across Australia receive the best possible care, regardless of how and where they live, and their type of lung cancer.

What is Molecular Testing and Why is it Important?

Lung cancer has different types and sub-types. Molecular testing identifies specific changes (biomarkers) in the genes of a person's tumour, helping doctors select treatments that target these specific changes. Targeted therapies are special treatments designed to attack cancer cells more precisely. They often work better and cause fewer side effects than traditional chemotherapy. The testing can be complex, and so clear recommendations are needed to ensure accurate results.

What Types of Lung Cancer Might Benefit from Molecular Testing?

1

Non-Small Cell Lung Cancer (NSCLC), Adenocarcinoma Type

- **Testing for Early-Stage Lung Cancer**
 - **Early Stage (IA):** No molecular testing is needed.
 - **Early Stage (IB to III):** For early-stage (IB to III) lung cancer, doctors should test for key biomarkers like EGFR, ALK, ROS1, and PD-L1. If it's possible and practical, additional tests may check for KRAS, BRAF, HER2, MET, RET, and NTRK.
- **Testing for Advanced-Stage Lung Cancer**
 - **Advanced Stage (IV):** Comprehensive molecular testing is recommended. Test for EGFR, BRAF, KRAS, HER2, ALK, ROS1, MET, RET, NTRK, and PD-L1 biomarkers.
 - **Cancer Progression:** If the cancer comes back or no longer responds to treatment, doctors may use molecular testing again to find other treatment options.

2

Non-Small Cell Lung Cancer (NSCLC), Squamous Cell Type

- **Advanced Stage:** MET and PD-L1 molecular testing is recommended. Tests for additional biomarkers may be requested, especially if the patient is young and a non-smoker, as these patients may have important molecular alterations in this setting.

3

Small Cell Lung Cancer (SCLC)

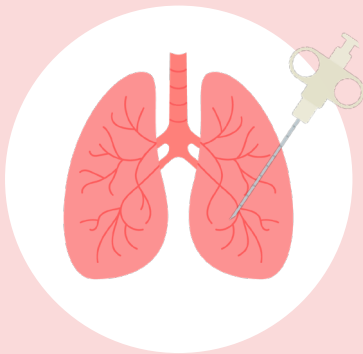
- **All Stages:** Currently, biomarker testing is not needed.

Types of Molecular Testing

Testing is typically done on a small sample of the tumour, called a biopsy, taken from the lung when the cancer is first diagnosed. A common test used is called polymerase chain reaction (PCR), which helps find specific genetic changes in cancer cells. Experts recommend genomic analysis using a method called *next-generation sequencing* (NGS) because it can test many genes at once using one sample, saving time and tissue.

If a biopsy sample is not available, a blood test (sometimes called a "liquid biopsy") might be used. Molecular testing using blood may be less accurate, so it is only recommended if a biopsy isn't possible or if faster results are needed.

Samples used for testing

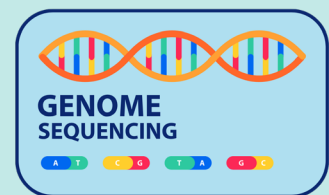
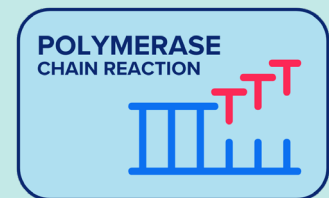


Biopsy



Blood test ("liquid biopsy")

Common tests



Timing and Cost

For patients with advanced Non-Small Cell Lung Cancer (NSCLC), doctors should order molecular testing as soon as possible so there are no delays in starting the right treatment. Most routine molecular tests are covered by Medicare, so patients usually don't have to pay for them.

Molecular pathology laboratories should aim to report the results of molecular testing ideally in 5 working days, but no more than 10 days after receiving the sample. This timeframe helps patients receive optimum lung cancer care in a timely manner. The molecular testing is undertaken after a diagnosis of lung cancer has been made so this also takes time.

Understanding and Sharing Test Results

The results should be clear to the oncologist with explanations by a pathologist or expert scientist. The medical specialist can then explain the results to the patient, caregiver and family. The report should outline which biomarkers were found and how they might be relevant for treatment. Sometimes clinical trials for new treatments may be an option, especially if new biomarkers and treatments are identified.

It is also important to note that these tests look only at the genetic make up of tumour cells within a lung cancer and not the genetics of a person. They are not intended to test if the cancer is inherited and if it can be passed through families. While there is a small chance that the molecular tests discussed in this document may suggest that a cancer gene is inherited, additional testing would be needed to confirm this. Any additional testing must be agreed to by the patient and will be explained by your doctor and healthcare team.

Equal Access and High-Quality Care

These recommendations were developed to help ensure that all Australians—regardless of location, cultural and socioeconomic background, or lung cancer type—have access to high-quality diagnostic molecular testing. The recommendations encourage patients and their families to work with doctors in deciding the best care plan for each individual, emphasising teamwork and shared decision-making.

Future Steps

It is intended that the recommendations will help improve the quality of life for people with lung cancer by providing options for tailored treatment which can reduce treatment side effects and unnecessary repetitive biopsies. Ongoing research will help identify gaps in molecular testing services across Australia and find ways to ensure all Australians receive the best lung cancer care possible, now and in the future.



Glossary of Biomarkers for Lung Cancer (Non-Small Cell Lung Cancer)

Essential biomarkers

EGFR – epidermal growth factor receptor

ALK – anaplastic lymphoma kinase

ROS1 – ROS proto-oncogene 1

PD-L1 – Programmed Death-Ligand 1

Additional biomarkers

KRAS – Kirsten rat sarcoma virus (where first identified)

BRAF – gene encoding B-Raf protein

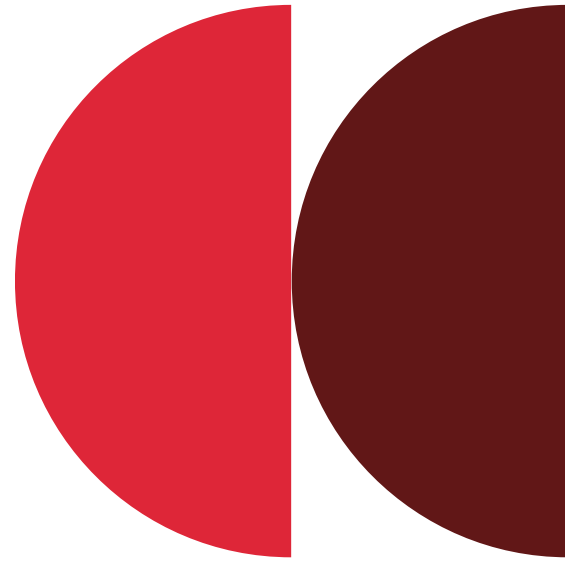
HER2 – human epidermal growth factor receptor 2

MET – Mesenchymal Epithelial Transition

RET – rearranged during transfection

NTRK – neurotrophic tyrosine kinase receptor


National Cancer Institute definition of cancer terms, medical abbreviations: <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/ros1-gene>



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