

Biomarker Testing in Non-Small Cell Lung Cancer (NSCLC)

A guide for people with lung cancer and
their loved ones



What is biomarker testing and why is it important?

Biomarker testing (sometimes called molecular or genomic testing) looks for specific features in cancer cells known as biomarkers. In lung cancer, biomarkers may include genetic mutations (sometimes called variants or changes) present in the tumour.

“ *Although I initially received chemotherapy, I received targeted therapy after I got the results of my biomarker test.* **Sally** ”

Some types of NSCLC are driven by particular mutations, and knowing which ones are present can help your clinical team decide which treatments are most likely to work for you.

Most genetic mutations linked to lung cancer are not inherited. They develop within cancer cells during a person's lifetime and are called acquired mutations.

Identifying a biomarker may:

- Help determine whether a targeted therapy is suitable
- Help guide decisions about immunotherapy
- Provide information about clinical trial options

“ *I had surgery to remove a mass in my lung. I didn't know I was tested at the time, but my biomarker test revealed my cancer didn't carry a variant that had a targeted treatment.* **Brian** ”

Not everyone will have a biomarker that changes their treatment options. If no targetable biomarker is found, other treatments such as immunotherapy, chemotherapy, or combination treatments may still be appropriate and effective.

In many cases, biomarker testing is carried out automatically as part of your diagnosis, so you may not need to request it.

*** You can always ask your clinical team whether you have or will be tested for biomarkers, and the reasoning for their decision.**

Which biomarkers are usually tested?

National guidance in the UK recommends testing for a range of biomarkers in people with advanced NSCLC (particularly non-squamous types), and in some other situations depending on clinical judgement, including in some earlier stage cases.

These commonly include genomic biomarkers such as:

- EGFR (including both common and rarer mutations)
- ALK rearrangements • ROS1 rearrangements • BRAFV600E
- MET exon 14 skipping • RET rearrangements • NTRK gene fusions
- HER2 (ERBB2) alterations • KRAS G12C

And protein biomarkers such as:

- PD-L1 expression (a protein measured on cancer cells that helps indicate whether immunotherapy is likely to be beneficial, with higher levels generally associated with a better response)

*** Your clinical team will decide which tests are appropriate based on your specific diagnosis, but you can always ask which biomarkers are being tested.**

How is biomarker testing carried out?

▶ *Step 1 - Collecting a sample*

Testing is usually performed on a sample of tumour tissue taken during a biopsy. A biopsy is a procedure used to take a small sample of tissue from the body so it can be examined more closely. This may be done using a small needle, a camera (such as during a bronchoscopy), or occasionally a small surgical procedure, depending on where the tumour is located.

A blood test (sometimes called a 'liquid biopsy') may also be used as part of the testing process. In some cases, it may be carried out alongside or before a tissue biopsy to help speed up results. This approach is being used more widely across the UK, although practice may vary between hospitals.

A liquid biopsy may not detect all mutations, so both types of testing may be used. A tissue biopsy is usually needed to confirm the diagnosis.

How is biomarker testing carried out?



▶ *Step 2 - Laboratory analysis*

Your biopsy sample is sent to a specialist laboratory where it is analysed. Many hospitals use tests that look for several biomarkers at the same time. National guidance aims for biomarker test results to be available within around 10 working days (2 weeks), although this can vary depending on the hospital and the tests being carried out.

*** You can always ask your clinical team for an update on when to expect your results.**

▶ *Step 3 - Discussing the results*

Once your biomarker test results are available, they are usually reviewed by a multidisciplinary team (MDT), which includes specialists such as oncologists, radiologists and pathologists. Your clinical team will then explain what the results mean and how they may affect your treatment options.

Occasionally a sample may not provide enough material to test, or results may be inconclusive. If this happens, your clinical team will discuss the options with you, which may include a repeat biopsy or a liquid biopsy.

*** You can always ask for more information if anything is unclear. You have the right to clear information about your diagnosis and treatment.**

Understanding your results and treatment options

Your biomarker test results can help guide which treatments may be suitable for you.

If a biomarker is identified, you may be offered:

- Targeted therapies – treatments designed to target specific changes (mutations) within cancer cells. These work differently from treatments like chemotherapy and are often taken as tablets, although some may be given in other ways.
- Immunotherapy, which may be offered based on PD-L1 levels (a protein measured on cancer cells) and other clinical factors
- A combination of treatments
- A clinical trial, if a suitable new treatment is available

For some biomarkers, targeted treatments may be used after initial treatment, rather than as the first option.

Not all identified biomarkers will have a currently available targeted treatment. If no targetable biomarker is found, there are still many effective treatment options available. Many treatments do not rely on a specific genetic change.

Your treatment plan will also depend on your general health, your preferences, and other medical factors.

You will have regular follow-up appointments to monitor how treatment is affecting you and whether it is controlling the cancer. Over time, cancers can develop resistance to treatment, and further testing (such as a repeat biopsy or liquid biopsy) may be recommended to guide future options.

* Questions you may want to ask:

What do my results mean for my treatment options?

- How will we know if the treatment is working?
- What side effects should I look out for?
- How long might this treatment work for?
- What are the next steps if this treatment stops working?
- Are there any clinical trials I should know about?

Guide for loved ones

Being diagnosed with lung cancer can be overwhelming, and your loved one may not feel able to ask questions or take in information at first. With their permission, you may wish to speak to the clinical team about whether biomarker testing is planned and when results are expected.

It is important to understand that even if a biomarker is found and a targeted treatment is available, lung cancer is still a serious illness. However, biomarker results can help guide treatment options and may give some indication of how treatment could work.

Information about biomarkers and targeted treatments can be difficult to understand. The clinical team is there to support both you and your loved one, so do ask them to explain anything that is unclear.

We understand that your loved one is likely to be your priority right now, but it's important that you also look after yourself, have support, and know where to seek advice.

Macmillan Cancer Support

www.macmillan.org.uk/cancer-information-and-support/supporting-someone

Maggie's

www.maggies.org/cancer-support/supporting-someone-cancer/support-adult-carers/

Mind

www.mind.org.uk/information-support/helping-someone-else/carers-friends-family-coping-support/

“ I was first diagnosed with a tumour in the brain, but a scan showed that I had lung cancer. My biomarker test showed that my cancer was ALK positive, so I was put on a targeted treatment. ”

Andy

Support and further information



Biomarker-specific support groups:

ALK Positive Lung Cancer UK www.alkpositive.org.uk

Support and advocacy for ALK+ lung cancer

EGFR Positive UK www.egfrpositive.org.uk

Support for people with EGFR+ lung cancer

RET Positive www.retpositive.org/

Support for people with RET+ cancers

EGFR Resisters www.egfrcancer.org/

Global EGFR+ patient community and resources

ROSI ders (international community) www.theroslders.org

Global support community for people with ROSI+ cancers

ROSI ders UK www.roslders-cancer.uk/

UK-based patient support group for people with ROSI+ cancers

MET Crusaders www.metcrusaders.org/

Global support community for MET+ cancer

Exon 20 Group www.exon20group.org/

International support for EGFR exon 20 and HER2

Your hospital team may also be able to direct you to local support services.

Support and further information



Roy Castle Lung Cancer Foundation

www.roycastle.org

UK lung cancer charity offering practical, emotional and treatment information

Cancer Research UK

www.cancerresearchuk.org

Trusted cancer information

NHS

www.nhs.uk/conditions/lung-cancer

NHS patient information on lung cancer

Macmillan Cancer Support

www.macmillan.org.uk

UK cancer support and helpline

References - This factsheet is informed by current UK national guidance, including NICE guidance and NHS lung cancer pathways, and has been reviewed by a UK lung cancer specialist.
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