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Pneumology

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Fast Facts Information Sheets for Patients

KRAS G12C in Metastatic Non-Small Cell Lung Cancer

A guide for people living with the disease

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KRAS G12C in metastatic non-small cell lung cancer – a guide for people living with the disease

What is non-small cell lung cancer?

There are three main types of non-small cell lung cancer (**NSCLC**): adenocarcinoma, squamous cell carcinoma, and large cell carcinoma. In any of these, cancer cells can break away from the lung, travel to another part of the body, and form another tumor.

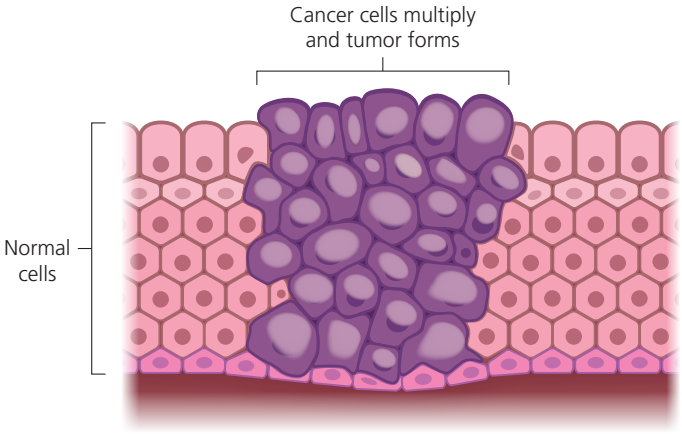
Remember, wherever they are, these are lung cancer cells and and may respond to treatments that help lung cancer.

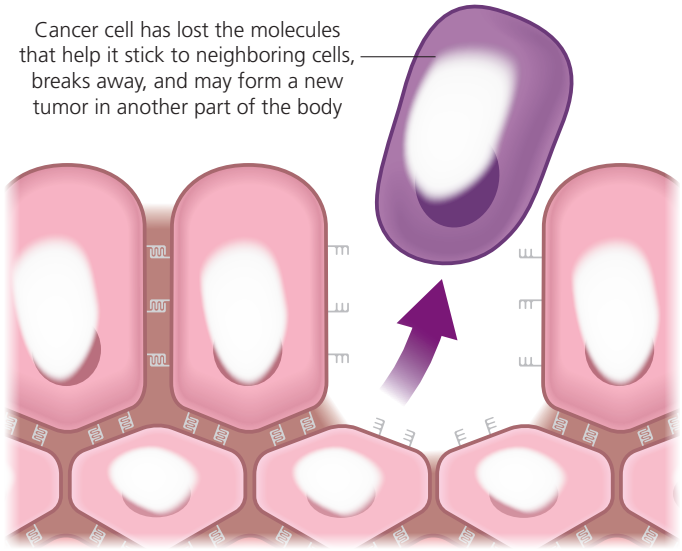
What makes cancer cells abnormal?

Cancer cells are abnormal because they have changes – **mutations** – in their genes. Genes carry instructions for making proteins that control how body cells multiply and function.

A mutation that encourages cancer cells to grow uncontrollably is called a **driver mutation**. **KRAS G12C** is a common driver mutation in NSCLC cells.

Mutated genes in cancer cells make abnormal proteins. It's these that cause cancer cells to behave differently from normal cells – they don't stick together, grow too quickly, and don't die when they should. Some mutations are inherited from a parent, but most – like KRAS mutations in NSCLC – are only found in the cancer cells and aren't inherited or passed on to your children.

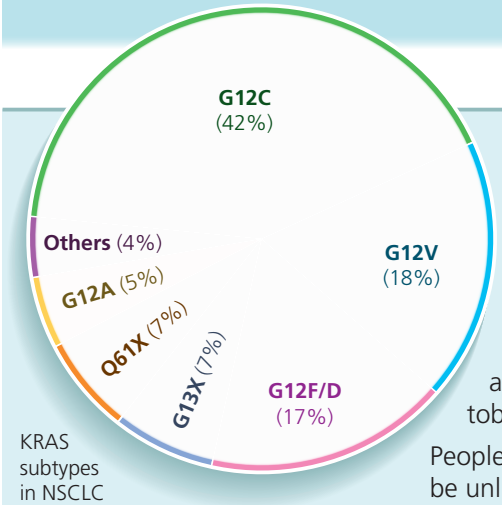




What are biomarkers?

Biomarkers include genes and proteins that can be used to measure a disease and its progress. Knowing biomarker levels helps doctors to make better treatment choices.

If tests show your cancer has a biomarker, then a drug that targets it may help to successfully treat your cancer. This is a way of **targeting your treatment** – the treatment is specifically chosen to treat your cancer.



KRAS subtypes in NSCLC

Scheffler et al. *J Thorac Oncol* 2019;14:606–16.

Biomarkers and NSCLC

Important biomarkers in NSCLC include KRAS, EGFR, and ALK. KRAS mutations are the most common, found in up to 1 in 4 cases (25%).

There are different types of KRAS mutations. Researchers are working on cancer drugs that target these KRAS subtypes.

G12C is the most common – more than 4 in every 10 (40%) KRAS mutations are the G12C subtype. It's often linked to damage caused by exposure to tobacco smoke.

People who had advanced NSCLC with a KRAS mutation (including G12C) used to be unlikely to survive for a long time. But now treatments have been developed that target cancers with this biomarker and help to block cancer cell growth.

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Types of treatment that you may be offered

Chemotherapy (also known as 'chemo') uses drugs to kill fast-growing cells in your body. Because chemotherapy drugs can affect some healthy, non-cancer cells in your body, they may cause side effects. The healthy cells usually recover but the cancer cells eventually die.

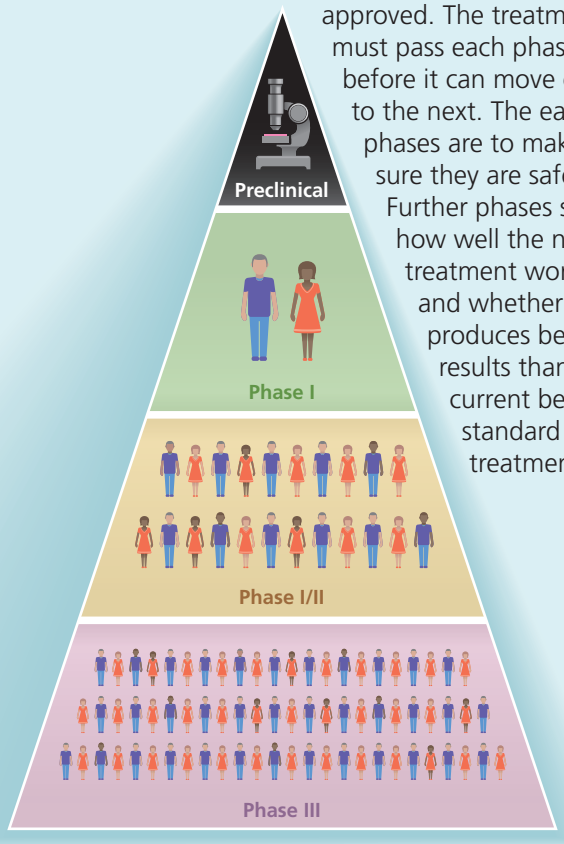
Immunotherapy (also known as 'immuno-oncology' or 'I-O') helps the body's immune system to recognize, target, and kill cancer cells. It may also make the immune system attack healthy cells, which can cause side effects.

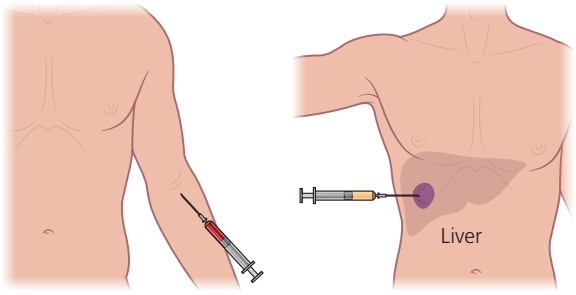
Targeted therapy works by specifically targeting biomarkers that help cancer cells survive and grow, and acts like a switch that stops them from doing this. For example, if your cancer cells have a KRAS mutation, they will produce an abnormal form of KRAS protein. A therapy that is targeted against abnormal KRAS stops it from delivering the message telling the cancer cells to divide, but does not affect healthy, non-cancer cells.

Clinical trials

Research is going on all the time into new treatments for cancer. There are more targeted therapies in development. All potential treatments that show promise in early tests need to enter **clinical trials**. So, if there is no approved therapy for your cancer, there may be a clinical trial of a new treatment that you can join, if you qualify for it.

There are several different **phases** of clinical trials that new treatments must go through before they can be approved. The treatment must pass each phase before it can move on to the next. The earliest phases are to make sure they are safe. Further phases show how well the new treatment works and whether it produces better results than the current best standard treatment.





Liquid biopsy | Liver biopsy

How do I know if my cancer cells have KRAS G12C mutation?

Your doctor will need to test your cancer cells to see if they have this mutation. This can be done by taking a biopsy sample from the primary tumor or another location in the lung. There is also a blood test for KRAS G12C. Your doctor may call this a liquid biopsy. Or, they may take some cells from other areas of the body that the cancer has spread to – cancers can sometimes develop new gene changes as they grow. So, you may need to have a liver biopsy from a tumor in your liver, for example.

Your doctor will do this by putting a needle through the skin. First, you'll have some local anesthetic and then the doctor will remove a core of cancerous tissue. They may use an ultrasound or CT scan to see where to put the needle.

What happens next?

Your doctor will explain your test results. If your cancer cells have the KRAS G12C biomarker, your doctor may suggest treatment with a **targeted therapy**.

Ask your doctor

- What specific type of lung cancer do I have?
- Was my tumor (or blood) tested for mutations?
- Have you found any important (driver) mutations in my cancer cells?
- Can you explain the full report and the available options to me?
- Is a targeted therapy an option for me?
- How do you think this treatment may help me?
- What are the side effects of the treatment you recommend?
- What will happen if I have more serious side effects?
- Are there any clinical trials that you think would be suitable for me?
- What are the treatment options if this type of treatment isn't suitable for me or doesn't help?

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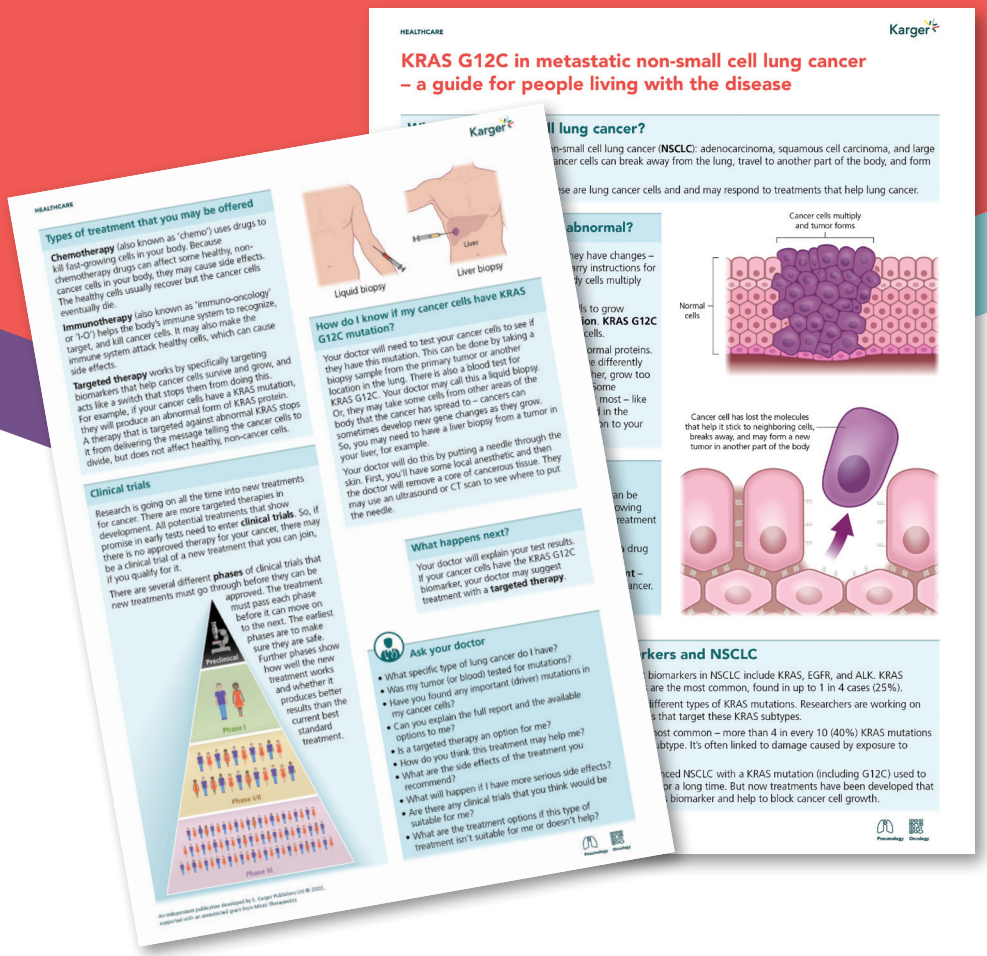

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