3. Diagnosing Lung Cancer

Lung cancer is a difficult disease to diagnose and there is no routine screening in Australia for its early detection. For some people, lung cancer is discovered during a routine medical check-up, while others may have had signs and symptoms for many months.

Often your GP arranges the first tests to assess your symptoms. Make sure you discuss all of your symptoms with your doctor so that they can work with you to choose the most useful tests to confirm your diagnosis and help develop a treatment plan. This can be a worrying and tiring time, especially if you need several tests. If these tests don’t rule out cancer, it’s usual to be referred to a lung specialist who will arrange further tests and advise you about treatment options.

There are many different types of diagnostic imaging and pathology tests used to accurately diagnose and stage lung cancer. The purpose of these tests is to identify the type of lung cancer (NSCLC or SCLC) you have and if the cancer has spread to other parts of your body. Unfortunately, all the tests are rarely located at one centre so some tests may need to be outsourced to other hospitals/centres.

You’re likely to see many doctors and together this team of health professionals (called a multidisciplinary team, see Chapter 4) will determine which tests are relevant to your lung cancer. They will organise the tests for you as part of managing your treatment and care.

**Diagnostic imaging**

Medical imaging involves painless procedures that take pictures of the inside of your body. These scans can show if you have lung cancer and if it has spread. This will help your medical team decide on the best treatment plan for you.

**Chest x-ray**

An x-ray of the chest is a scan that can show tumours one centimetre wide or larger. Small, hidden tumours don’t always show up on x-rays, so you may have further tests.

**CT scan**

A CT (computerised tomography) scan uses x-ray beams to take three-dimensional pictures of the inside of your body. CT scans are usually done at a hospital or a radiology service and can be used to identify smaller tumours than those found by x-rays. CT scans can also show enlarged lymph nodes or tumours in other parts of the body.

You may be asked not to eat or drink for a few hours before the CT scan. An iodine contrast dye also may be injected into a vein in your arm to make the scan pictures clearer. Before the scan, tell your health care team if you’re allergic to iodine, fish or dyes.

A CT scan usually takes less than 10 minutes. You will lie flat on a table while the CT scanner – a machine that is large and round like a doughnut – rotates around you.

**PET scan**

A PET (positron emission tomography) scan is a specialised imaging test that is available at some major hospitals. A PET scan can be used to stage lung cancer (see page 13) or find cancer that has spread to other parts of the body.

To begin this procedure you’re injected with a radioactive glucose solution. It takes 30 to 90 minutes for the fluid to go through your body. Then you will have a body scan. It shows ‘hot spots’ in the body where the glucose has accumulated – this happens where there are active cells, like cancer cells.
Case Study: Peter’s diagnosis

Peter, 54, was stunned when told he had secondary tumours in his spine.

“I went to the doctor with a sore back, it’d been sore for years!” Peter said.

“The next few days were a busy, medical blur – CAT scans, an MRI, a PET scan and a needle biopsy of the spine.”

Peter’s GP gave him the results: non-small-cell lung cancer – adenocarcinoma of the lung, stage 4. He was told that the median survival time for someone with this type and stage of lung cancer was about a year – with about one per cent of patients living for five years, or more.

Following two years of treatment, including targeted therapy, Peter remains cancer free.
Before having a biopsy, it's a good idea to discuss the procedure with your doctor. In some cases, there isn't a lot of tissue available to biopsy and this can make the procedure difficult to perform. However, you can plan with your doctor to ensure the initial biopsy yields the best possible information.

**Bronchoscopy**

A bronchoscopy allows the doctor to look directly into the airways (bronchi) and, if required, biopsy samples of lung tissue.

The procedure is performed using a flexible tube called a bronchoscope, which is inserted through your nose or mouth and down your windpipe (trachea). The bronchoscope may feel uncomfortable, but it should not be painful. You will be given either a light sedation or a general anaesthetic and the back of your throat is numbed with a local anaesthetic.

During the bronchoscopy, the doctor may take a tissue sample if they can see something that looks like cancer. Even if the doctor can't see an obvious tumour they will still take samples if they are suspicious of cancer. Tissue samples may be collected via a biopsy or by 'washing' or 'brushing'.

In washing, saline water is injected through the bronchoscope into the area of interest and suctioned back. This process dislodges cells that can be analysed in the laboratory. Alternatively, a soft brush-like tool can be inserted through the bronchoscope to collect cells from the bronchi by brushing the airway.

**Endobronchial ultrasound (EBUS)**

An EBUS is a type of bronchoscopy procedure that allows the doctor to examine and take tissue samples through the airways (bronchi) and windpipe (trachea). Samples may be taken from an adjacent tumour or lymph node.

The doctor uses a bronchoscope with a small ultrasound probe on the end. The bronchoscope is put down your throat into your trachea. The ultrasound probe uses sound waves to create a picture of the body and measure the size and position of the tumour.

After an EBUS, you may have a sore throat or cough up a small amount of blood. Tell your medical team how you're feeling, so that they can monitor you.

**Mediastinoscopy**

A mediastinoscopy is a procedure that allows a surgeon to examine and sample the lymph nodes at the centre of your chest. A rigid tube is inserted through a small cut in the front of your neck and passed down the outside of your windpipe (trachea). The surgeon inspects the area between the lungs (mediastinum) and removes some tissue.

A mediastinoscopy is usually a day procedure, but an overnight hospital stay may be required. The scar on your neck is usually quite small and will be covered with a dressing.

**Thoracotomy**

Usually a thoracotomy is done if other tests fail to provide a diagnosis. It's an operation performed by a surgeon, under general anaesthetic, to take a tissue sample (biopsy) or remove the tumour.

The surgery can be performed in two ways, either:
- the surgeon makes some small cuts in your chest and inserts a small camera and surgical instrument called a thoracoscope; or
- the surgeon opens the chest cavity through a larger cut on your back.

Post-surgery, you will probably stay in hospital for a few days while you recover.
3. Diagnosing Lung Cancer

Mutation testing
Within each type of lung cancer there are subtypes. Several lung cancer subtypes can be classified by changes or mutations to specific genes.

By testing for these gene mutations your doctor can tailor your treatment regime for the best outcome. For example, from clinical trials, we know that NSCLC patients with certain mutations can significantly benefit from targeted therapies while patients without these mutations gain more benefit from standard chemotherapy.

For your cancer to be mutation tested, your doctor will require a tissue biopsy sample.

Further tests
You may have other tests such as blood and breathing tests, and bone, brain or MRI scans. If your medical team recommends surgery to treat your cancer, you may need to undergo further tests to ensure your heart and lungs can cope with the operation being considered. If you have any questions, please speak with your doctors or nurse.

Staging lung cancer
Based on the diagnostic test results, your doctor will assign the cancer a stage, between one and four. Staging the cancer helps your health care team determine the best treatment.

Staging is based on how much cancer is in the body and where it is located. It takes into account:

- the size of the cancer in the lung;
- whether it’s present in other organs in the chest; and
- if it has spread to lymph nodes (glands) or to other parts of the body.

The most common tests to stage lung cancer include x-rays, CT scans, PET scans, bone scans, MRI scans, and sometimes more biopsies to test for cancer cells. Your doctor will work out the most appropriate combination of tests for you.

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<tr>
<th>Small cell and non-small cell lung cancer stages</th>
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<td><strong>Stage 1</strong></td>
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<td><strong>Stage 2</strong></td>
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<td><strong>Stage 3A</strong></td>
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<td><strong>Stage 4</strong></td>
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Prognosis

A prognosis is the expected outcome of a disease. This is a general prediction because it isn't possible for any doctor to predict the exact course of your illness. Instead, your doctor can only give you an idea about the general prognosis for people with your type and stage of cancer.

Most people want to know how long they have to live. When asking this question, it's important to remember that your doctor doesn't have a crystal ball. They can't predict your future; they can only give an educated guess about your survival.

Sometimes, doctors have access to information on the average survival of a group of patients with the same type and stage of cancer like yours. When describing this information, the term you will hear used is 'median survival' period. This is the period at which 50 per cent (or half) of the patients remained alive after treatment finished.

The median survival period is not a fixed survival timeframe. It's a point in a timeline. For example, in a group of 200 patients two years post treatment, 100 people are alive – this is the median point. After five years, 50 people are alive and after 10 years, four remain alive. There are always people who are the exception to the rule and live much longer than the median, which is why your doctor cannot give you an exact answer about your expected survival.

Important factors in assessing your prognosis include test results, the type of cancer you have, the rate and depth of tumour growth, how well you respond to treatment, and other factors such as age, fitness and medical history.

The results of lung cancer treatments are best when the cancer is found and treated early, as with most types of cancer. People who have surgery in the early stages of lung cancer have the best chance of a cure.
Chapter Summary

- Clinicians use a range of tests to confirm a lung cancer diagnosis and help develop a treatment plan.

- Painless, diagnostic imaging tests – x-rays, CT scans or PET scans – are used to take pictures inside your body to see if you have a growth and if it has spread.

- To diagnose the type of cancer you have, a sample is needed for a pathologist to examine and test.
  - If you’re coughing up phlegm, your doctor may ask you to collect some phlegm.
  - A sample of tissue may be collected from a growth via a biopsy. A ‘core biopsy’ is the most common procedure, where a small needle is inserted through the skin to take a sample from the growth.
  - A bronchoscopy is when a flexible tube is inserted through your nose or mouth and down into your lungs to examine your airways. During this procedure, the doctor may take a tissue sample. An endobronchial ultrasound is a type of bronchoscopy procedure.
  - Other methods for collecting tissue samples include a mediastinoscopy (to examine and sample the lymph nodes at the centre of your chest) and a thoracotomy.

- If enough tissue is available, your cancer may be tested for genetic mutations. This further diagnosis can help tailor your treatment.

- Based on the test results, your doctor will assign the cancer a stage, between one and four. Staging is based on how much cancer is in the body and where it is located – it defines how advanced the cancer is.

- When the tests are completed, your doctor will discuss with you a general predication, or prognosis, for the expected outcome of your disease. This is an educated guess about your survival based on the type of cancer you have and the rate and depth of tumour growth.