

High-grade
non-Hodgkin
lymphoma

Lymphoma
action 

High-grade non-Hodgkin lymphoma

Diffuse large B-cell lymphoma

Other large B-cell lymphomas

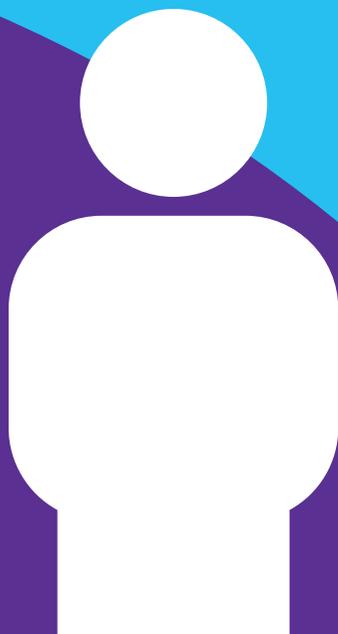
Burkitt lymphoma

Mantle cell lymphoma

Central nervous system lymphoma

T-cell lymphomas

Other high-grade non-Hodgkin
lymphomas



About this book

High-grade non-Hodgkin lymphomas (NHLs) are fast-growing types of lymphoma.

This booklet tells you what high-grade NHL is and how it is diagnosed and treated. It offers tips on coping well and provides space for you to make notes.

This booklet is divided into parts. You can dip in and out of it and read only the sections relevant to you at a given time.

Important and summary points are set to the section colour font.



Lists practical tips.



Space for questions and notes.



Signposts to other resources you might find relevant.

This booklet uses some scientific words. Words that are in **blue bold** are explained in the Glossary on pages 135–138.

The information in this booklet can be made available in large print.



Your lymphoma type and stage

Your treatment

Health professional	Name and contact details
GP	
Consultant haematologist/ oncologist	
Key worker	
Clinical nurse specialist	

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Overview

Lymphoma is a cancer of the lymphatic system. The cancerous cells are **lymphocytes** – a type of **white blood cell** that fights infection. Lymphoma can develop when lymphocytes do not die, divide or grow properly due to accidental changes in their genes.

It can develop anywhere in your body, so there are many possible symptoms. It is common to have swollen lymph nodes (glands) as lymphocytes normally collect in the **lymph nodes**. Other common symptoms include fatigue, night sweats, fevers and weight loss.

High-grade non-Hodgkin lymphomas (NHL) are fast-growing. This means they might need treatment quickly but they are usually treated with the aim of cure (getting rid of them so they don't come back).

High-grade NHL can develop from a B lymphocyte (B cell) into a B-cell lymphoma, or from a T lymphocyte (T cell) into a T-cell lymphoma.

Who gets it?

In most cases, no one knows what causes high-grade NHL. Having a weaker immune system can increase the risk of developing certain types of NHL, eg being on drugs that

suppress the immune system or having an infection (eg **HIV**) that seriously weakens your immune system.

How is it diagnosed?

You need a **biopsy** to confirm your diagnosis and to find out what type of lymphoma you have – a sample of the abnormal tissue or a whole lymph node is removed and examined under a microscope. Blood tests and scans find out how your body is affected by lymphoma and about your general health. Some people have tests to look for lymphoma in certain parts of the body, eg a **bone marrow** biopsy or a lumbar puncture.

How is it treated?

Some people with low-risk early-stage high-grade NHL have a short course (usually 3–4 cycles) of chemotherapy or chemo-immunotherapy (chemotherapy and **antibody** therapy) followed by radiotherapy to the affected area.

Most people with high-grade NHL have 6–8 cycles of chemotherapy or chemo-immunotherapy. You might then have radiotherapy if you had **bulky disease** before treatment, or if there is still active lymphoma. Radiotherapy might be used to reduce lymphoma that is causing urgent problems, eg pressing on the spinal cord.

Some types of high-grade NHL need more intensive treatment, possibly including a **stem cell transplant**.



Once all the tests were back, I was diagnosed with diffuse large B-cell lymphoma and told I would be treated with R-CHOP chemotherapy. Even the sound of these words seemed strange to me.

Colin, diagnosed with diffuse large B-cell lymphoma in his 80s

What is lymphoma?

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What is the lymphatic system?

The lymphatic system is part of your immune system – your body's natural defence against infection. A network of tubes called lymph vessels and **lymph nodes** (glands) runs throughout your body. The lymphatic system also includes organs that are part of your immune system, such as the **spleen**, tonsils and **thymus**.

White blood cells called **lymphocytes** help your body to fight infection. They collect in your lymph nodes.

Some groups of lymph nodes are easy to feel, particularly in your neck, under your arms and in your groin. Others are deeper inside your body and can only be seen on scans.

What is lymphoma?

Lymphoma can happen when lymphocytes start to grow in an abnormal, uncontrolled way.

Lymphoma is not just one disease. There are many different types of lymphoma, but they all start with a cancerous lymphocyte.

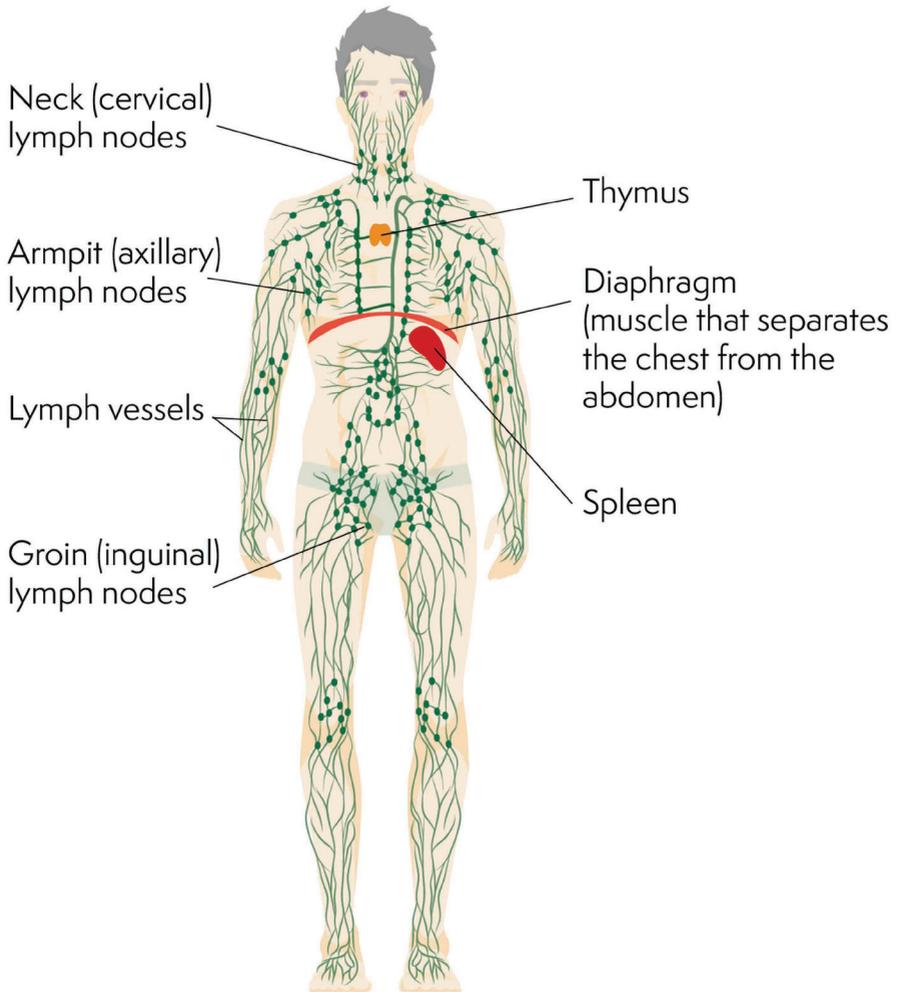


Figure: The lymphatic system

How do lymphomas develop?

Lymphocytes are always dividing to make new cells. When you are fighting an infection, your body makes many new lymphocytes very quickly. Many types of lymphocytes are produced, but only those that help to fight the infection are useful to the immune system. Any lymphocytes that do not target that infection usually die and only the useful lymphocytes survive. This process is carefully controlled by your body. Lymphoma can develop when this carefully controlled system breaks down.

Genetic changes in cells can mean they no longer respond properly to signals in the body. The cells might divide when they do not need to or might not die when they should. This breakdown in control lets abnormal lymphocytes build up and they can form a lump. This lump is lymphoma.

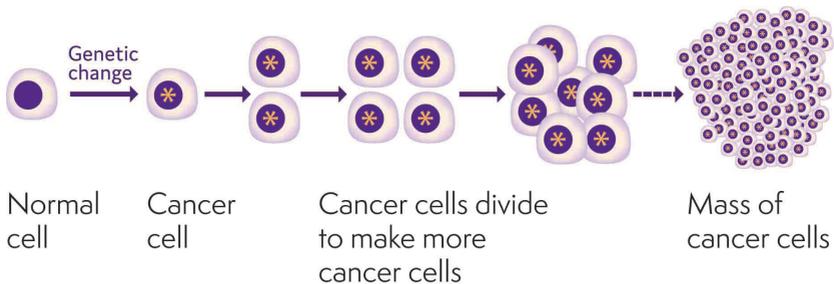


Figure: How cancer develops

Lymphoma most commonly develops in the lymph nodes, but abnormal lymphocytes may collect in any other part of the body, such as the spleen, liver and bone marrow.

Lymphoma that grows outside the lymphatic system is called **'extranodal'**.

What types of lymphoma are there?

There are more than 60 different types of lymphoma.

I had heard of lymphoma, but thought there were just 2 types. What I found when I searched on the internet was just baffling – there was a list of different types of lymphoma that was as long as my arm.

Jennie, diagnosed with Burkitt lymphoma at 27

The simplest distinction is between Hodgkin lymphomas and non-Hodgkin lymphomas (NHL), depending on the types of cell they contain. NHL can be further grouped as:

- B-cell lymphomas (which develop from B cells) or T-cell lymphomas (which develop from T cells)
- B-cell lymphomas can be high-grade (fast-growing or aggressive) or low-grade (slow-growing or indolent). T-cell lymphomas are usually high-grade.

There are many types of lymphoma within each group. Each type behaves differently and may need specific treatment. There is more about the different types on pages 112–134.



My consultant explained that there had not been many studies done in my type of lymphoma yet, and that information on it on the internet might well just be discouraging and unhelpful. The conversation with him was reassuring – he explained my condition and filled me with a lot more confidence.

Kat, diagnosed with double-hit lymphoma at 32

What is ‘B-cell’ or ‘T-cell’ non-Hodgkin lymphoma?

B cells and T cells are the main types of lymphocyte.

Both types of lymphocyte are made in the bone marrow.

B cells also mature in the bone marrow, but T cells mature in the thymus. Both types then live mainly in your lymph nodes and other lymphatic tissues, ready to fight infection.

B cells and T cells have different roles in the immune system:

- B cells respond to infections by producing **antibodies** that attach themselves to substances not normally found in the body, eg bacteria, and attract other parts of the immune system to destroy the ‘invader’.
- T cells attack ‘invaders’ like viruses and cancer directly.

There is another type of lymphocyte called a natural killer (NK) cell. These are like T cells, except that they do not develop in the thymus. They kill cells that have been infected by a virus or are turning into cancer.

Most high-grade NHLs diagnosed in the UK are B-cell lymphomas (about 9 in every 10 cases), but some people develop T-cell lymphoma.

What does 'high-grade' mean?

'High-grade' means the cancer cells are dividing quickly, so 'high-grade' lymphomas are fast-growing. They are often described as aggressive.

This might sound worrying but fast-growing cells are often more sensitive to treatment than slow-growing cells. Many high-grade lymphomas are treated with the aim of curing them.

What causes lymphoma?

In most cases, lymphoma has no known cause.

Scientists do know that:

- you are unlikely to have done anything to cause the lymphoma
- you did not catch your lymphoma from anyone and you can't pass it on to someone else.

Anyone can develop lymphoma but the risk of developing lymphoma is higher for people whose immune system does not work well (known as 'immunodeficiency'). For example, lymphoma is more common in people who have **HIV** or people who have had an organ transplant.

Some types of lymphoma have been linked with certain viruses or autoimmune conditions (pages 112–134).

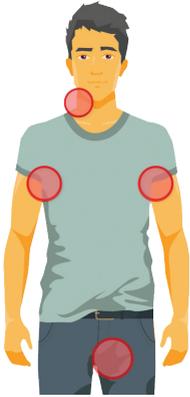
What are the symptoms of lymphoma?

Lymphoma can be difficult to diagnose as many of the symptoms of lymphoma are seen in other, usually less serious conditions. People with the same type of lymphoma can have different symptoms to each other.

Some symptoms are common to many types of cancer, eg fatigue (extreme tiredness). Cancer cells take up energy and nutrients that healthy cells need, so people often feel fatigued.

Lymph nodes swell when lymphocytes collect to fight an infection, but this swelling, which can be painful, usually goes down in a couple of weeks. The most common symptom of lymphoma is a painless lump that grows or does not go away.

See pages 17–18 for the most common symptoms of lymphoma.



Swollen lymph nodes – often in the neck, armpit or groin. Not all lymphomas have obvious lumps. Sometimes lumps are deep inside where you can't feel them



Fatigue (extreme tiredness)



Unexplained weight loss (without dieting)



Drenching sweats
(especially at night)



Itching (with or without
a rash)

Some people get fevers (a temperature above 37.5°C). Fevers often occur together with night sweats and weight loss. They can occur separately. These 3 symptoms are known as '**B symptoms**'. Some people have repeated or persistent infections (infections they can't shake off).

If lymphoma develops outside of the lymph nodes, eg in the stomach, lungs, skin or brain, you might not have a lump that you can feel. You might have other symptoms. The symptoms you are likely to get depend on where the lymphoma is, so there are many possible symptoms.

For example, lymphoma can cause:

- abdominal (tummy) pain or back pain
- diarrhoea or change in bowel habit
- jaundice
- a persistent cough or breathlessness
- headaches.

You might have different symptoms or a combination of symptoms.

There is no single symptom that is unique to lymphoma – most people have a mixture of symptoms.



I was feeling really 'off colour' and looking back I had started to slow down. My appetite was going – which was unusual for me – and as a result I was losing weight. I regularly check my weight and have been the same for many years, but now I was half a stone lighter. This was a signal that all was not right.

Colin, diagnosed with diffuse large B-cell lymphoma in his 80s



When I went in to receive my diagnosis, I don't think anything could have shocked me. Frankly, I was past caring about the diagnosis. I was just anxious to start doing something about whatever was wrong.

Ian, diagnosed with Burkitt lymphoma at 47

Tests, scans and staging

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This section describes the most common tests for lymphoma. You may not have them all – your doctor decides what tests you need. You may have some of these tests after you are diagnosed to find out more about the lymphoma and how it is affecting you. You also have tests and scans during your treatment and afterwards. You can come back to this section whenever it is relevant to you.

Being diagnosed

Getting a diagnosis means finding out what is wrong. You need tests at a hospital to confirm you have lymphoma. These tests almost always include a **biopsy** (see page 23). You are likely to have other tests, too.

It can take a couple of weeks to get the results of all the tests. This can be a worrying time, but it is important that your doctors find out as much as possible about your lymphoma so they can give you the best treatment. They want to find out:

- what type of lymphoma you have (see pages 112–134)
- the stage of your lymphoma (how much of your body is affected – see page 34)
- about your general health, to make sure you are fit enough for the treatment they recommend.

Blood tests

You have blood tests as part of your diagnosis, at regular intervals during treatment and during your follow-up. Blood tests help doctors check your general health. They can help doctors decide what treatment you are fit enough to have and whether you have any health conditions that mean you might need additional treatment to support your body.

During treatment, blood tests also help to find out how well your body is tolerating the treatment. These tests can help doctors decide when it is safe for you to have the next dose of treatment and if you need any treatment for side effects (unwanted effects of your lymphoma treatment).

Biopsy

In this test, a doctor removes a sample of abnormal tissue (eg a **lymph node**) for examination under a microscope and other tests. For most people, a biopsy is the only way to tell whether or not a lump is lymphoma.

What happens?

Most biopsies are done as outpatient procedures under local or general **anaesthetic**, so you can go home the same day. You might have to stay in hospital overnight.

The type of biopsy that you are offered depends on what is standard practice at your hospital and where the abnormal tissue is. You might have:

- an **excision biopsy**, where a surgeon removes a whole lymph node.
- a **core biopsy**, where a radiologist (a doctor who interprets scans and X-rays) removes a small sample of the lymph node, sometimes using scans (eg ultrasound) to guide them.

If the affected lymph nodes are deep inside your body, the surgeon or radiologist may remove all or part of a node using laparoscopic surgery (key-hole surgery) or by endoscopy (thin tube with a camera passed through the mouth).

The biopsy is examined under a microscope by a pathologist (a doctor who studies diseased tissues under a microscope). They do tests on the cells to find out exactly what type of lymphoma you have. These tests give more information about the cells, for instance about changes to their DNA or to the proteins on their surface.

The results usually take around a week to come back, sometimes longer for rare lymphomas or if the lymphoma is difficult to diagnose. Occasionally, a second biopsy is needed if the first one does not give enough information to make a diagnosis.

X-rays and scans

There are lots of lymph nodes deep inside your body and there are parts of your body that can't be seen or felt from the surface.

X-rays and scans are used by doctors to assess what parts of your body are affected by lymphoma. There are different types of scans that build images in different ways, for example:

- X-rays and CT or CAT scans use X-rays
- an MRI uses magnetic waves
- a PET measures radioactive sugar, and is usually combined with a CT scan as a single scan
- an ultrasound uses sound waves.

Some scans are better than others at assessing different parts of your body.

Don't worry if you have a different type of scan to someone else – your doctor decides which type of scan is best for your circumstances, and you may need more than one type.

X-rays and scans don't hurt and are usually done on an outpatient basis, so you can go home after your test.

X-rays

X-rays are used to look at various parts of your body. For example, you may have a chest X-ray to see if there are any enlarged lymph nodes in your chest. You don't feel anything during the test, and it should only take a few minutes.

CT or CAT scans

Computed tomography (CT) or computed axial tomography (CAT) scans use a series of X-rays to form pictures of your body in cross-section (image 'slices' through your body).

Most people have a special liquid dye (a contrast agent) that makes organs easier to see. It's given before the scan either as a drink or an injection into a vein. The dye might make you feel hot all over, but this usually lasts only a few minutes. Tell the staff if you feel this way.

To have the scan, you lie on a padded table that moves your body through a camera that is shaped like a ring doughnut. The space is quite open so you shouldn't feel 'hemmed in' or claustrophobic.

The scan usually takes 15–45 minutes but preparation can take longer if you are having a special dye. You need to lie still and you might be asked to hold your breath for up to 20 seconds at a time.

PET scans

Positron-emission tomography (PET) scans help doctors tell the difference between different types of tissue, eg normal tissue and lymphoma.

They use a radioactive form of sugar to look at how active the cells are. Cancer cells are more active than normal cells, and so take up more radioactive sugar than normal cells. The radioactivity in the cancer cells is then detected with a special camera.

A PET scan is normally combined with a CT scan. The PET scan looks at activity of the cells, and the CT scan gives a more detailed picture of structures inside your body.

When you arrive at the clinic, you have the radioactive sugar as an injection into a vein. You then have to rest for an hour or more while the cells take up the sugar. The scan is similar to a CT but you have to be in hospital for around 2–3 hours in total to have the radioactive sugar.



Stock photo. Posed by model.

Figure: A PET scan

Results from clinical trials suggest that PET/CT scans are very good at finding lymphoma in the **bone marrow**, too. In the future, they may replace bone marrow biopsies in some situations (see page 30).

You may have a PET/CT scan as part of diagnosis (before treatment) and after treatment to check how well your treatment has worked. Some people have PET/CT scans during treatment to find out how well the treatment is working. Doctors continue to learn how best to use these scans, and they are increasingly important in assessing lymphoma.

MRI scans

Magnetic resonance imaging (MRI) scans are particularly good for looking at soft tissues, such as the brain.

To have the scan, you lie on a padded table that moves you into a cylinder (tube).

The cylinder uses a strong magnet. Tell the staff if you have any metal implants, such as a pacemaker or an artificial joint. You should also mention any recent operations, including your biopsy, in case the surgeons used metal staples.



Figure: An MRI scan

The scan normally takes 30–60 minutes. The scanner can be very noisy – you might be given headphones to help block the noise. As you are in a small space, you may feel ‘hemmed in’ or claustrophobic. Let the staff know if you are worried about this or anything else relating to having an MRI.



Tips about scans

- Read and follow any instructions carefully, eg you might be asked not to eat or exercise before your scan.
- Talk to the staff in the department if you are worried about anything regarding your X-ray or scan.
- Tell your medical team about any other conditions you have – you might not be able to have contrast dye with some medical conditions. If you have diabetes, your doctor needs to take special care with a PET scan to make sure your blood sugar is not too high.
- Ask what you should wear and if you need to remove any jewellery.
- Ask if you can listen to music during the scan.

Bone marrow biopsy

If your doctor thinks lymphoma might be in your bone marrow, you might have a bone marrow biopsy.

What happens?

In a bone marrow biopsy, a sample of bone marrow, usually from your hip, is removed and looked at under a microscope.

Bone marrow tests are usually done as an outpatient.

You have the area numbed with a local anaesthetic. Then the doctor or specialist nurse passes the biopsy needle through the skin and into the bone. Two types of bone marrow sample are usually taken:

- **bone marrow aspirate**, which is a little of the liquid found in the bone marrow space
- **bone marrow trephine**, which is a small sample of harder bone marrow tissue.

The whole procedure usually takes 10–15 minutes. The procedure can be uncomfortable, so you may need painkillers before and after your bone marrow test. If you are very anxious, it may be possible for you to have a mild sedative beforehand or gas and air (oxygen and nitrous oxide) during the procedure. Sedatives aren't recommended for everyone so ask about this when you're told you need the test.

Lumbar puncture

Some people have lymphoma in their **central nervous system (CNS)**, which includes the brain and spinal cord. In a lumbar puncture, a few drops of the cerebrospinal fluid (CSF), which surrounds your brain and spinal cord, are removed and looked at under a microscope.

What happens?

You are asked to either lie on your side with your knees bent or to sit upright and bend forwards over a cushioned table. You have an injection of local anaesthetic into your lower back. The doctor then puts a special needle into a gap between 2 bones (vertebrae) in your lower back and collects a sample of CSF. You may be given an injection of chemotherapy into the CSF at the same time – this is called ‘intrathecal chemotherapy’. It can reduce the risk of lymphoma spreading to your CNS (see page 60).

During the lumbar puncture, you need to lie very still but the procedure only takes about 5–10 minutes.

The test isn’t usually painful, but the injection of local anaesthetic may sting. Some people get a headache after a lumbar puncture. You are likely to be asked to lie flat for at least an hour after the procedure to help prevent this. Drink plenty of water and take painkillers after your lumbar puncture if you need them. Your medical team can advise you which painkillers are best.

Questions about tests and scans

- What tests do I need and why?
- Are the tests painful?
- Do I need an anaesthetic or sedation for any of these tests?
- Where or when will I have the tests?
- Is there anything I need to be careful of after the test?
- Can I drive?
- Can I go back to work straightaway?
- How long before I get the results?
- Will someone explain the test results to me?



Notes

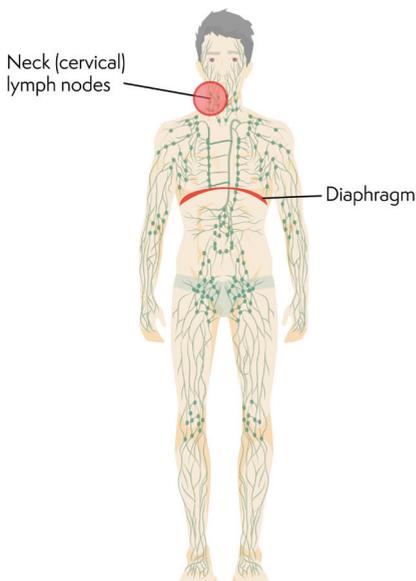
What does the 'stage' mean?

Once all the test results are ready, your doctor can tell where the lymphoma is in your body. This is called the 'stage' of your lymphoma. It is important in planning your treatment.

The different stages are:

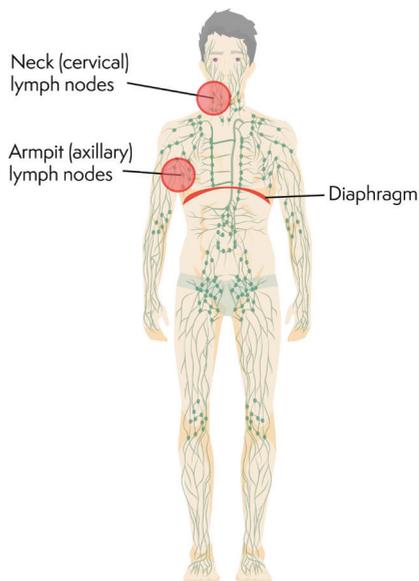
Stage 1

One group of lymph nodes affected either above or below the diaphragm*



Stage 2

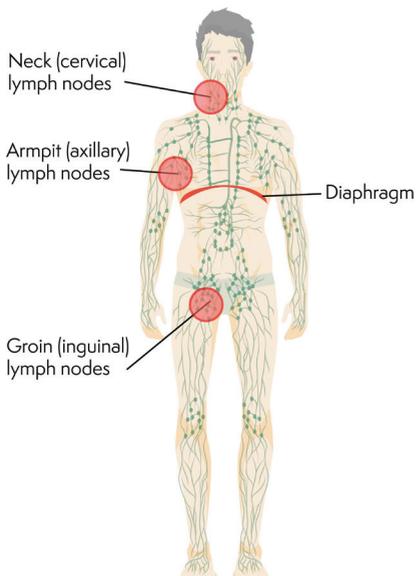
Two or more groups of lymph nodes affected either above or below the diaphragm*



You may see stages of lymphoma written down as Roman numerals: I, II, III, IV.

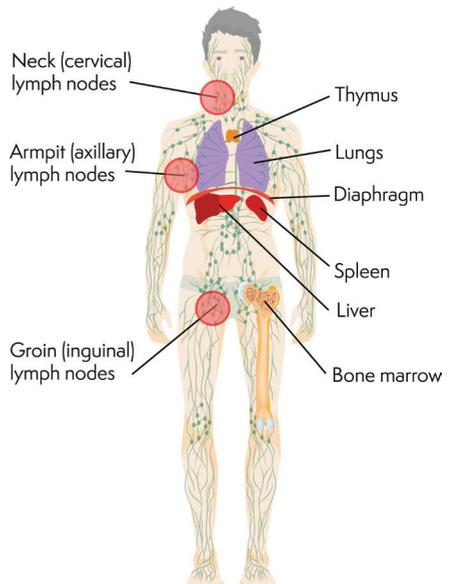
Stage 3

Lymph nodes affected on both sides of the diaphragm*



Stage 4

Lymphoma is found in organs outside the lymphatic system or in the bone marrow



*The diaphragm is the muscle that separates the chest from the abdomen.

Letters might be added to the stage:

A	You don't have any B symptoms (fevers, night sweats and/or weight loss)
B	You have 1 or more of the B symptoms (fevers, night sweats and/or weight loss)
E	You have extranodal lymphoma – lymphoma outside your lymphatic system but localised (stage 1E or 2E)
X	You have bulky disease – you have very enlarged lymph nodes in 1 or more areas. These areas may need extra treatment.

What do 'early-stage' and 'advanced-stage' mean?

Early-stage lymphoma is localised lymphoma. Stage 1 and some stage 2 lymphomas where the affected lymph nodes are close together are early-stage.

Advanced-stage lymphoma is more widespread lymphoma. Stage 3 and 4 lymphomas are advanced stage. Some stage 2 lymphomas are treated as advanced stage, eg those where affected groups of lymph nodes are far apart.

It is not uncommon for lymphoma to be advanced-stage when it is diagnosed, as the lymphatic system covers the whole body. There are good treatments for lymphoma at all stages. It is important to recognise that lymphoma is different from some other types of cancer and many advanced-stage high-grade NHLs are treated with the aim of curing them.



Notes



The doctor explained that this was very treatable and he was so positive and reassuring that it didn't enter my head that the treatment would be anything other than successful.

Sue, diagnosed with diffuse large B-cell lymphoma at 32

How is high-grade NHL treated?

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Planning treatment

Once your medical team have the results of all the tests, they have the information they need to plan your treatment. They do this based on:

- the type of lymphoma you have
- the stage of your lymphoma.

Other important points that your medical team take into account include:

- your thoughts on treatment and what is important to you
- your general health and how fit you are
- any other medical conditions that are affecting you
- treatment you are taking for other medical conditions
- the size of your lumps and where they are
- your blood test results.

Sometimes people with the same type of lymphoma have different treatments. Don't be worried if the people you talk to at the hospital are having treatments different from yours. Your treatment is tailored to you.

Completing the tests and planning your treatment can take a few weeks. This might seem like a long time, but the information being collected is very important.

You might be able to have treatment to manage your symptoms in the meantime, eg painkillers or steroids. Your medical team needs to know as much as possible about you and your illness before choosing the best treatment for you. It is natural to feel worried when you are waiting to find out more or to start treatment. You may find it helpful to talk about it to someone, for example a specialist nurse or your GP.

Who is involved in my care?

You have a lead consultant or consultants responsible for your care – this is likely to be a haematologist (a doctor who specialises in treating blood problems) or an oncologist (a doctor who specialises in treating cancer). Other doctors work with your consultant as well to help treat you. Your hospital might have a clinical nurse specialist (CNS) or other specialist cancer nurse who is experienced in working with people with lymphoma.

Your case should be discussed in a multidisciplinary team (MDT) meeting, where several specialists discuss the best treatment for you based on your test results and individual circumstances.

You will see a range of different health professionals specialised in different areas. Use the table at the front of this booklet to keep track of them.



I cannot stress how much care and attention I have received from my healthcare team. They are every one of them truly heroes.

Bernard, diagnosed with diffuse large B-cell lymphoma at 60

Where will I be treated?

You may have your treatment at a local hospital or at a larger hospital with a cancer centre. Sometimes people have their treatment shared between the 2 places ('shared care' arrangement).

Your GP, or the doctor who diagnoses your lymphoma, should send you to the nearest hospital with a lymphoma specialist. You might be asked to choose which hospital to go to. Ask any questions you need to help you make a decision.

Children and young people (under 25) with lymphoma are usually treated by specialists at a children and young people's cancer centre known as a Principal Treatment Centre (PTC). Young people's care may also be shared with a local designated teenage and young adult hospital, with guidance from the PTC.



We have a booklet specially designed for young people with lymphoma. We also have specific information for under-25s on our website. Find out more at www.lymphoma-action.org.uk/CYP or call our Information and Support Team on 0808 808 5555.

The majority of people with lymphoma have most of their treatment as an outpatient, meaning you don't have to stay regularly in hospital overnight. You may have to stay in hospital for some or all of your treatment, depending on what type of lymphoma you have, what treatment you are having and how the treatment is affecting you. It can help to find out what facilities are available and to ask what you can bring with you to make your stay more comfortable.

Ask as many questions as you need to about your hospital and how your care is going to be arranged.

Questions to ask about hospital and your medical team

- Does the hospital have a lymphoma clinical nurse specialist or other specialist cancer nurse?
- Does your doctor meet regularly with other lymphoma specialists?
- What other experts are there to help if you need them? For example, can you meet with a dietitian or a counsellor if you need to?
- Does the hospital take part in clinical trials?
- What facilities and support are available at the hospital and in the community? How do the hospital and community teams communicate?



Notes



Notes

Will my doctor help me make decisions about treatment?

You and your doctor can decide together what treatment is best for you. In many cases, treatment starts quickly for high-grade lymphoma. Treatment can also help to ease symptoms. Your doctor recommends the treatment they think is best for you.



I was told they needed to start treatment straightaway as the lymphoma was getting out of control. In less than 2 weeks I felt I had lost everything, but facing a life-threatening illness meant that I had no choice but to get on with it.

Jennie, diagnosed with Burkitt lymphoma aged 27



Some types of lymphoma have a standard treatment that has been shown to give the best outcomes. If you are fit enough and there is good chance of cure with standard treatment, your doctor is likely to recommend you go ahead with that treatment.

If you have other health conditions, or are generally less fit, your doctor might recommend a gentler treatment or adapt the treatment to make it safer for you. Such treatments may be associated with fewer or less severe side effects, but might be less likely to cure your lymphoma.

It can be difficult to weigh up the benefits and risks of the possible treatments but it is important that whatever decision you make is the right one for you. Your doctor can help you weigh up the options and you can talk to other people, too, like your clinical nurse specialist if you have one, your family and friends or your GP. Ask as many questions as you need to help you understand your options and to make a decision.

Research and clinical trials

Clinical trials are research studies involving human volunteers.

Your doctor may ask if you would like to take part in a clinical trial. You can ask your doctor if there are any clinical trials that might be suitable for you. It might be possible for you to take part in a clinical trial running at another centre if there is not a suitable trial running at your centre.



Find out more about clinical trials at Lymphoma TrialsLink www.lymphoma-action.org.uk/TrialsLink. You can search for a trial that might be suitable for you, or download or request our *Clinical trials* booklet.

Some trials are designed to test new treatments that are not yet available for lymphoma, either alone or by adding new treatments to current treatment. Others aim to improve treatments currently in use. They may test whether the lymphoma could be treated with different drugs or fewer drugs, for example. Some involve changing treatment regimens to make them easier to cope with.

Taking part in a clinical trial is voluntary – you are given a lot of information to help you make a decision and you do not have to take part. If you do decide to take part in a clinical trial, you can change your mind at any time.



I feel fortunate to have taken part in the trial. It encouraged me to learn about my illness, however scared I was at first. The trial nurses were always there if I had any questions and I am still being monitored closely after finishing treatment.

Roger, diagnosed with primary CNS lymphoma at 48



What is the usual treatment for high-grade NHL?

Treatment for high-grade NHL is planned individually so you might have different treatment to someone else with the same type of lymphoma. In general:

- most people with high-grade NHL have chemotherapy
- people with B-cell lymphomas usually have an **antibody** treatment like rituximab together with their chemotherapy (chemo-immunotherapy)
- some people have radiotherapy as well as chemotherapy – radiotherapy is rarely used on its own for high-grade NHL.

Treatment for early-stage high-grade NHL

If you have early-stage high-grade NHL, you might have a shorter course (usually 3–4 cycles) of chemotherapy or chemo-immunotherapy (chemotherapy and rituximab) followed by radiotherapy to the affected area.

If your lymphoma is affecting **extranodal** sites or has any features that suggest it might be more difficult to treat, it is treated with a full course of chemotherapy, as described on page 50 for advanced-stage high-grade NHL.

Treatment for advanced-stage high-grade NHL

If you have advanced-stage high-grade NHL, you may be offered a full course (usually 6–8 cycles) of chemotherapy or chemo-immunotherapy.

Most people with advanced-stage high-grade NHL do not usually have radiotherapy as it can only be used to treat small areas and advanced-stage disease is widespread.

You may, however, have radiotherapy after chemotherapy if you still have an active area of lymphoma or if you had bulky disease (very large lymph nodes). This can reduce your chance of **relapse**. Radiotherapy might be used to reduce lymphoma that is causing urgent problems, eg pressing on the spinal cord.

More intensive treatments

Some types of high-grade NHL have a higher risk of relapsing after initial treatment or may not respond well to certain chemotherapy regimens. These types of lymphoma might be treated with more intensive chemotherapy, if you are fit enough. Your doctor might recommend a **stem cell transplant** (see page 81) if you respond to chemotherapy. A stem cell transplant can make it more likely that you stay in remission for longer.

Lymphoma treatment with other conditions

Most people diagnosed with high-grade NHL are over 60. Other health problems become more common as people get older, so treatments may need to be adjusted to make them safer. For example, some chemotherapy drugs can affect your heart so doctors may avoid them if you have heart problems.

Your doctors want to give you the most effective treatment for your lymphoma but they have to balance this against the risk of you developing serious side effects.

Your doctor may arrange for you to have organ function tests to make sure your heart, lungs and kidneys are working well, eg an echocardiogram (a heart scan) or spirometry (a lung test).

If you are older, your **bone marrow** may also take longer to recover after each cycle of chemotherapy. You might need lower doses or longer gaps between treatments. Most people have other treatments, eg growth factors (G-CSF), to boost white blood cell counts and reduce the risk of infection.

You are advised not to get pregnant or to get your partner pregnant if you are having, or will soon start, treatment for lymphoma. If you're already pregnant when you are diagnosed, your medical team will take this into account when planning your treatment. Ask your medical team to guide you.



Visit www.lymphoma-action.org.uk/Pregnancy for more information on treatment for lymphoma during pregnancy.

Ask your doctor any questions you have about your treatment and why they feel it is the best treatment for you.

Questions about treatment

- What treatment am I having?
- What does the treatment involve?
- When will my treatment start?
- How long will it take for the treatment to work?
- How effective is this treatment? Will it cure the lymphoma?
- Would it be helpful to get a second opinion or be treated in another centre (especially for rarer lymphomas)?
- I have another illness – will this affect my treatment?
- Where will I have my treatment? Do I need to come into hospital?
- How long will each treatment session last for?
- How many weeks or months will I be having treatment for?
- What happens if I decide I don't want any treatment?



Notes



I coped well with the first few treatments, but as the sessions wore on, I became weaker and developed some side effects.

Bernard, diagnosed with diffuse large B-cell lymphoma at 60

Treatments for high-grade NHL

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Radiotherapy	75
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This section describes the types of treatment used for high-grade NHL. Read only the sections that describe the types of treatment you are having. It can be confusing to read about types of treatment you are not likely to have. Ask your medical team for advice if you are not sure what your treatment involves.

Chemotherapy

Chemotherapy is treatment with anti-cancer drugs.

Chemotherapy drugs normally work best on cells that are dividing quickly – like cancer cells. Each drug targets cells in a different way, so giving several drugs together increases the chances of killing more cells. Chemotherapy regimens (combinations of drugs) are often given abbreviations of the names of drugs they include – each letter stands for the name of one of the drugs.

To kill as many cells as possible, chemotherapy is usually given in cycles. A cycle is a block of chemotherapy that is followed by a rest period that allows the healthy normal cells to recover.

You have several treatment cycles, each of which takes a few weeks. With each treatment cycle, more cells are destroyed and the lymphoma gradually shrinks. The whole treatment course usually takes several months. The exact timetable for your treatment depends on the particular chemotherapy regimen you are having.

How is chemotherapy given?

Most people with high-grade NHL have chemotherapy as an outpatient; they go to the hospital before treatment for blood tests and on treatment days, and go home afterwards. Some people stay in hospital for their chemotherapy as they have a regimen that takes longer to give or that is more likely to cause severe side effects. Whatever type of treatment you are having, you are likely to need to stay in hospital if you have severe side effects, for example, very low **blood counts** or an infection (see pages 63–64).

Your medical team give you specific verbal and written information about your treatment plan and what to expect.

Intravenous chemotherapy

Most chemotherapy is given **intravenously** (into a vein).



A bolus or ‘push’ dose is where a drug is given by injection into your vein. This can take a few minutes.



Some intravenous drugs have to be given through a drip (**infusion**), which can take from a few minutes to several hours.

Some chemotherapy drugs can sting as they go into the vein – tell your nurse if you have any discomfort as things can be done to relieve it.

Some people have a central line fitted. This is a tube that stays in place for the whole of your treatment so you don't need to have a needle every time you need treatment or a blood test. You might have a **central line** if you need intensive treatment or have problems having repeated needles into your veins.

The line is inserted either through a vein in your arm (PICC line) or directly into your chest (eg, Hickman® line). Some people have a line that ends in a reservoir (port) just under the skin on your chest. Your treatment can be injected into the port.

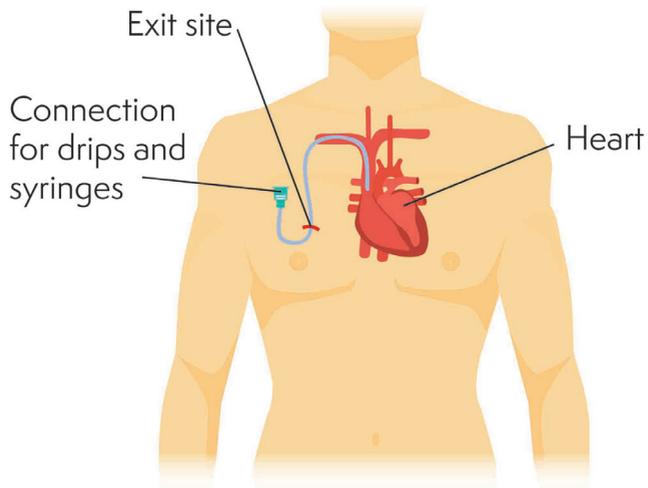


Figure: A central line in the chest

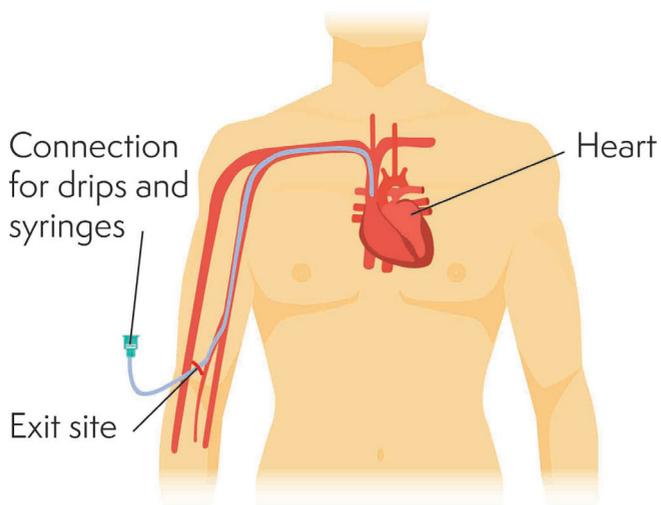


Figure: A PICC line

Your nurse should show you how to look after your line to help prevent infection and tell you what to do if you have any problems with it.



I had a Hickman® line fitted, which was a great piece of equipment. It made everything so much easier.

Jennie, diagnosed with Burkitt lymphoma aged 27

Oral chemotherapy

You may have chemotherapy tablets or capsules that you take orally (by mouth). You are given instructions on what to take and when, and how to handle and store the drugs.

Intrathecal chemotherapy

Some people are given **intrathecal (IT)** chemotherapy as part of their treatment. The brain is protected by the blood-brain barrier, a natural barrier that stops many drugs crossing from the bloodstream into the central nervous system. IT chemotherapy is given into the cerebrospinal fluid (CSF), which is fluid that surrounds and cushions the **central nervous system (CNS)** the brain and spinal cord.

The chemotherapy can then reach the CNS.

IT chemotherapy is given by lumbar puncture (see page 31).

You may be offered IT chemotherapy:

- to prevent your lymphoma spreading to your CSF or CNS; this is called 'CNS prophylaxis' and is commonly done for some types of high-grade NHL
- if your lymphoma is found in your CSF or CNS, which is very rare.

Not everyone in these situations has IT chemotherapy. Some chemotherapy that crosses the blood-brain barrier can be given intravenously.

CHOP chemotherapy

The most common chemotherapy regimen for high-grade NHL is CHOP (cyclophosphamide, hydroxydaunomycin, Oncovin® and the steroid prednisolone). It is usually given in cycles of 3 weeks, although sometimes it may be given in cycles of 2 weeks.

Usually, you go into hospital as an outpatient and have 3 drugs intravenously on the first day of each cycle. You go home after the drugs have been given.

You also take steroid tablets (prednisolone) for the first 5 days of each CHOP cycle – you can take these at home.

The remainder of the cycle is a rest period for your body to recover before the next cycle begins. Some people are admitted to hospital for the first cycle of treatment for monitoring and to have supportive treatments to reduce

the risk of serious side effects. This is most likely if you are at a higher risk of complications. You might then have the remaining cycles as an outpatient, depending how the treatment affects you.

You are likely to be given other drugs to help prevent or treat side effects (this is called supportive care – see page 85).

What is R-CHOP?

Almost all people having CHOP for a B-cell lymphoma are also given the antibody rituximab on the first day of each cycle. The treatment is then known as R-CHOP. There is more information about rituximab on page 70.

Other chemotherapy regimens

Some types of high-grade NHL are treated with other chemotherapy regimens. There are many different regimens and we don't list them all in this booklet, but the section on page 112 explains some of the differences in treatment for each type of high-grade NHL.

Your hospital team should give you full information about what treatment they recommend and how it is given. They can tell you what side effects you might expect from the drugs being used. Ask your team if you are unsure about anything to do with your treatment.

Side effects of chemotherapy

Chemotherapy works by killing any dividing cells. It kills lymphoma cells as well as healthy cells, particularly cells that divide rapidly, eg blood cells in the bone marrow or the cells that line the gut.

The damage to healthy cells causes many of the side effects (unwanted effects on your body) of chemotherapy.

Some side effects are common with many different chemotherapy drugs. Other side effects are associated only with certain drugs. The side effects you may get depend on what drugs you are having. The hospital should give you information about your drugs and what to expect, but it is impossible to say before you start treatment which side effects you will get.

Each person gets slightly different side effects, even if they are having the same treatment as someone else.

Effects on the blood

Some of the most common and serious side effects are effects on blood cells. Most chemotherapy regimens cause temporary damage to the bone marrow, which makes your body's blood cells. The different types of blood cells do different jobs in your body. The table on the next page explains what they are and what low levels (a shortage) might mean.

	White cells 	Red cells 	Platelets 
Medical name	Neutrophils and lymphocytes	Erythrocytes	Platelets
What they do	Fight infection	Carry oxygen	Stop bleeding
Name of shortage	Neutropenia and lymphopenia	Anaemia	Thrombocytopenia
Common symptoms	Infections	Pale skin, feeling tired, breathless, cold, dizzy	Bruising easily, bleeding longer or without warning (eg nosebleeds)
What happens if you have a shortage?	<ul style="list-style-type: none"> • Delay treatment • Take antibiotics if you have an infection • Growth factors given if needed 	<ul style="list-style-type: none"> • Red blood cell transfusion if needed 	<ul style="list-style-type: none"> • Delay treatment • Platelet transfusion if needed

Other common side effects

Some side effects are common with many different chemotherapy drugs:

- nausea (feeling sick) and vomiting
- change in taste, heartburn, indigestion and problems eating, which can cause weight loss
- bowel problems, like diarrhoea and constipation
- hair loss
- fatigue (extreme tiredness)
- cancer-related cognitive impairment ('chemo brain' – problems thinking and concentrating)
- sore mouth due to 'mucositis' (damage to cells lining your mouth)
- peripheral neuropathy (nerve damage), which can cause tingling or numbness in your hands and feet
- temporary or permanent stop of periods in women
- weight gain (often due to steroids like prednisolone) or weight loss
- changes in mood.

Some side effects occur more often with certain drugs. Your medical team can give you more information about the side effects associated with the specific drugs you are having.

Although most side effects are temporary and get better soon after treatment has finished, some can take longer to get better or even continue long-term.

Late effects might only develop months or years after treatment. It is important to be aware of what late effects can happen, so you can look out for symptoms. Checking for late effects is an important part of your follow-up (see page 89).

Long-term and late effects of chemotherapy

Effects on fertility: fertility problems are more likely with certain drugs, together with other factors like age. Some women also have a premature (early) menopause after chemotherapy and may need hormone replacement therapy (HRT). Your specialist should discuss potential changes to your fertility with you before treatment starts. You can discuss options like sperm and egg storage.

Heart problems: certain drugs like doxorubicin (hydroxydaunorubicin, the H in CHOP) can cause heart problems years later. You might need tests to see how well your heart is working before treatment and may need to avoid certain drugs if you already have heart problems. Your medical team can advise you of steps you can take to reduce the impact of possible heart problems in the future.

Blood disorders: some chemotherapy treatments slightly increase your risk of developing another cancer or some blood disorders in the future, such as myelodysplastic syndrome (MDS) and leukaemia. Even increased, this risk is still small.

After about 2 weeks, a dramatic transformation occurred, and I felt much better. That was, until the next treatment 6 days later.

Bernard, diagnosed with diffuse large B-cell lymphoma at 60



Visit www.lymphoma-action.org.uk/SideEffects for more information and advice on coping with side effects.



Tips for dealing with side effects

- Tell your medical team if you feel unwell in any way or if you have a fever (temperature above 38°C). Infections can be life-threatening and need prompt treatment.
- Ask your medical team for advice if you are experiencing side effects. They often can give you medicines that can help or they can give advice to manage side effects better.
- Tell your medical team if any medicines you are given don't work – there are often alternatives.

Questions to ask about side effects

- How long will it take to recover from my chemotherapy?
- What side effects am I likely to get?
- How long after treatment do side effects usually start?
- How long do side effects last for?
- What late effects are associated with my treatment?
- Is there anything I should look out for, or any screening programmes I should be aware of?
- How can I reduce my risk of late effects?



Notes

Antibody therapy, such as rituximab

Antibodies are made by the body's immune system and are an important part of its defence against infection. They stick to proteins called 'antigens' on the surface of cells, eg bacteria or viruses. They also attract other cells of the **immune system** that help to destroy infection.

Lymphoma cells have proteins on their surface too and these can be used as a target for man-made antibodies. These are monoclonal antibodies which means they only stick to a specific antigen.

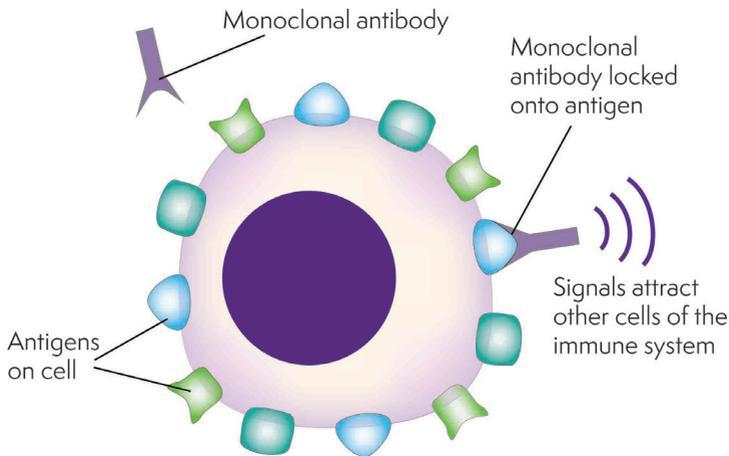


Figure: Monoclonal antibodies binding to antigens on a cancer cell

Antibody therapy (sometimes called 'immunotherapy') aims to target cancer cells more directly than chemotherapy or radiotherapy. This reduces the effects on normal cells that cause many of the side effects of less targeted treatments.

The antibody most often used for high-grade lymphoma is called rituximab. It targets an antigen called 'CD20'. Because CD20 is found only on B cells, rituximab is mainly used to treat B-cell lymphomas.

Newer antibodies to CD20 and antibodies that target other proteins found on lymphoma cells are also being developed and tested.

How is antibody therapy given?

Rituximab for high-grade NHL is usually given at the start of each cycle of chemotherapy. You have it as an outpatient and don't normally have to stay in hospital. It is usually given as an intravenous drip.

The first intravenous infusion is given slowly over a few hours to help prevent side effects. If you don't have a bad reaction, subsequent doses may be given more quickly (over 1–2 hours).

Rituximab is available as a subcutaneous (under the skin) injection into your abdomen (tummy) but this is more often used as a **maintenance** treatment for some people with low-grade NHL.

Side effects of antibody therapy

Most side effects of antibody therapy occur while the drip is being given (known as 'infusion-related' side effects) rather than later on. They are more common with the first infusion and include shivers, fevers and other flu-like symptoms.

When given subcutaneously, the skin where the injection was given can become red, swollen and painful.

You are given other drugs such as paracetamol and antihistamines to reduce the chances of infusion-related side effects.

Rarely, antibody therapy may cause a more serious allergic reaction, causing symptoms like fever, chills, swelling and difficulty breathing. If this happens, you may need to stay in hospital for a while as you recover. You may be able to have the infusion more slowly in future or you may be given supportive treatments to reduce the reaction. Rarely, your doctor may decide it is best to avoid this treatment.

Antibody therapies can also cause other side effects, like low **blood counts** (see page 64) and low levels of your normal antibodies, which can increase the risk of infection. Your medical team should give you information on the side effects of any treatment they recommend.

Other targeted therapies

Targeted therapies are sometimes also called ‘biological’ therapies. The changes that make lymphoma cells cancerous often affect normal biological pathways, allowing cancer cells to grow and divide. Targeted therapy can disrupt this process stopping the abnormal cells growing or causing them to die.

The main kind of targeted therapy used in high-grade NHL is antibody therapy. Many targeted therapies are being tested in clinical trials and a few are now being used for some types of high-grade NHL.

Most targeted therapies are currently used only for people whose lymphoma has **relapsed** or who can’t have other treatments. However, clinical trials continue to be done to find out how best these treatments can be used in people with lymphoma.

- 
- **Find out which targeted treatments are approved for your type of lymphoma at www.lymphoma-action.org.uk/Newer-Drugs**
 - **Visit www.lymphoma-action.org.uk/TrialsLink to find open clinical trials of targeted treatments that are suitable for you at Lymphoma TrialsLink.**



Notes

Radiotherapy

Radiotherapy uses high-energy X-rays to kill lymphoma cells by stopping them dividing. Lymphoma cells are very sensitive to radiotherapy, but the treatment is usually only given to small areas. In high-grade NHL, radiotherapy is used for:

- localised (early-stage) lymphoma that has not spread to **extranodal** sites – most often after a short course of chemotherapy or chemo-immunotherapy has been given
- areas with very large **lymph nodes (bulky disease)** at the beginning. It is given after a full course of chemotherapy or chemo-immunotherapy has finished, even if the lymphoma has shrunk.

How is radiotherapy given?

Radiotherapy is usually given daily, Monday to Friday, and treatment is spread over a few weeks. You can go home after each session. Radiotherapy is only available at specialist centres, so you may need to travel for your treatment. Your care there is overseen by a clinical oncologist (radiotherapy doctor). They see you to discuss your treatment before it begins and you can ask any questions you have.



Figure: A radiotherapy machine

You might need to make several visits to the radiotherapy department to plan your treatment before it starts. This usually includes a CT scan to map the area to be treated – a planning scan.

Each treatment takes 5–20 minutes and is painless. Most of this time is spent making sure you are in the correct position. It is very important that precisely the same area is treated each time.

Radiotherapy for lymphoma does not make you radioactive. There is no risk to those around you.

Side effects of radiotherapy

Although radiotherapy itself is painless, it can have uncomfortable side effects. Side effects of radiotherapy depend on which part of your body is being treated and the amount of radiotherapy you are having. Your team give you information about what to expect and how to take care of yourself.

You may have no side effects to start with – they tend to gradually become more obvious towards the end of the course and in the week or 2 after you have finished radiotherapy. Most radiotherapy side effects are short-term, but some can be long-term or permanent.

You are usually seen weekly in a review clinic in the radiotherapy department to see how you are getting on. It is important to let your team know about any side effects you have. Tell them if any of your side effects change during the course of your treatment. There are usually things that can be done or medicines that can be prescribed to help with side effects.

Many people have fatigue (feel very tired) after radiotherapy. It can take months after treatment for fatigue to go away completely.

In the area being treated, you might have sore skin and hair loss, but these are usually temporary.

Other side effects can happen if you have radiotherapy in certain areas:

- **Sore mouth and difficulty swallowing**, if you have radiotherapy to your head, neck or upper chest.
- **Nausea (feeling sick)**, if you have radiotherapy to your abdomen (tummy).
- **Effects on the blood**, usually if there are large bones in the treatment area. A low **white blood cell** count (**neutropenia**) can increase your risk of infection. A shortage of red blood cells (**anaemia**) can increase fatigue and make you feel short of breath. Radiotherapy rarely causes a shortage of **platelets (thrombocytopenia)**.

Radiotherapy can also cause **late effects**, which are side effects that develop months or years after treatment. The effects you are at risk of depend what area of your body was treated and how much radiotherapy was given. It is important to know that much of what is known about the risks of late effects comes from older studies. Modern treatments have reduced the risk of some of these complications.

It is important to be aware of what late effects can happen so you can look out for symptoms. You can reduce your risk of problems such as heart disease and stroke by keeping a healthy lifestyle. Checking for late effects is an important part of your follow-up (see page 89).

Increase in risk of heart disease and stroke: radiotherapy in the area of the heart can increase your risk of heart disease. Radiotherapy to the chest or neck might also cause hardening of your arteries. This can affect the blood supply to your brain or heart, increasing your risk of stroke.

Lung problems: scarring of lung tissue, or fibrosis, can be a side effect of radiotherapy to the chest. Once it develops, it is usually permanent. It can be mild and not cause any symptoms. Some people can become short of breath and unable to do as much exercise as they used to. Other lung diseases increase the risk of scarring. Smoking also increases this risk.

Reduced thyroid function: radiotherapy to the neck or upper chest area can affect your thyroid gland, which may then make less of the hormone thyroxine. This is called 'hypothyroidism' and may slow your metabolism, resulting in you feeling cold and tired, and gaining weight easily. This is not an immediate effect but can happen years after radiotherapy. It is usually picked up early by regular thyroid function blood tests. Hypothyroidism is usually easily treated with thyroxine tablets.

Second cancers: although it is used to treat cancer, radiotherapy can damage normal cells and increase the risk of developing another cancer many years later. The risk of second cancers has reduced with the use of better scans and modern techniques that target radiotherapy more accurately.

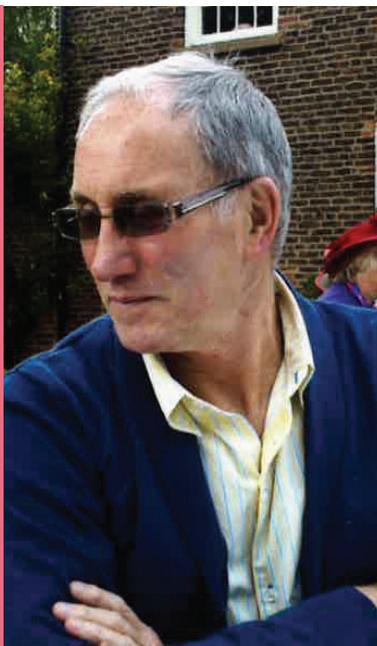
What second cancers you are at risk of depends on which part of your body was treated with radiotherapy. For example, radiotherapy to breast tissue in young women increases the risk of breast cancer. Women who have had radiotherapy may be offered breast screening at an earlier age than usual.

Your specialist will tell you what late effects you are at risk of and give you advice on how to reduce your risk.



I tolerated the chemotherapy [R-CHOP] pretty well. At least I thought I had, although others told me I was a bit more snappy and bad tempered, and looked very ill. I experienced side effects, with my hair falling out. I was also really aware of how fatigued I became.

Ron, diagnosed with diffuse large B-cell lymphoma at 57



Stem cell transplant

For most types of lymphoma, higher doses of a different chemotherapy regimen ('high dose treatment') and a **stem cell transplant** are only given if initial treatments haven't worked or if your lymphoma has come back.

However, for some types of high-grade NHL, your doctor might recommend a stem cell transplant if you respond to initial chemotherapy as it can reduce your risk of **relapse**.

A stem cell transplant might be recommended for:

- mantle cell lymphoma
- some types of T-cell lymphoma
- primary CNS lymphoma.

High doses of treatment can work well. However, they also cause damage to your **bone marrow** to the extent that it might not be able to recover by itself. Stem cells are special cells from the bone marrow that are continually making normal blood cells. If your bone marrow is damaged, you might not have enough stem cells to make the normal blood cells you need.

A stem cell transplant allows you to have high-dose treatment by giving you healthy stem cells after treatment.

Stem cells are usually collected before high-dose chemotherapy (and sometimes radiotherapy). Most people with lymphoma have an autologous stem cell transplant. This means that their own stem cells are collected before high-dose therapy then given back to them after high-dose therapy.

What happens during an autologous stem cell transplant?

If you are having an **autologous stem cell transplant**, you have treatments to increase your number of stem cells and move them from your bone marrow into your blood. They are then collected and frozen. When you have enough frozen stem cells and are ready for your transplant, you are admitted to hospital and have high doses of chemotherapy drugs for a few days. After high-dose therapy, you are given the stem cells back, just like a blood transfusion. You are closely monitored while the stem cells settle in your bone marrow where they start to grow and make new blood cells for your body. This helps your bone marrow to recover from the side effects of high-dose treatment.

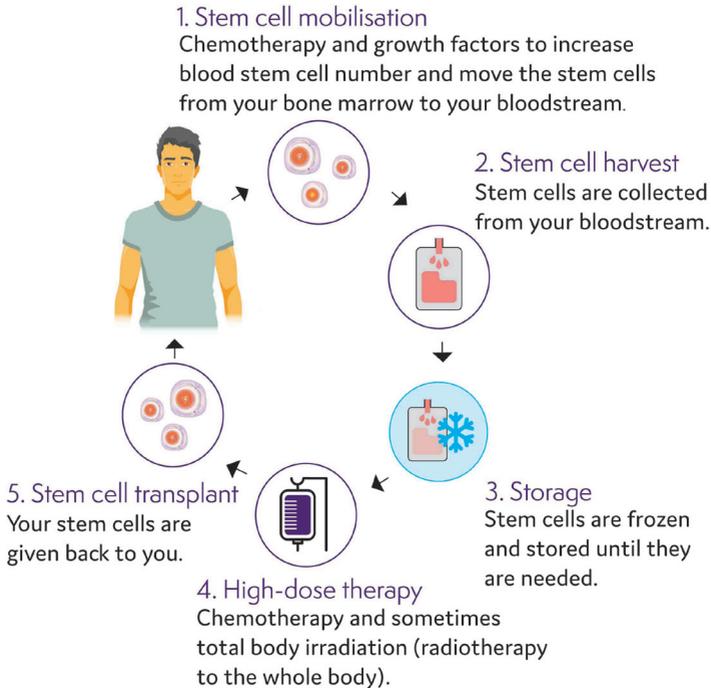


Figure: The autologous stem cell transplant process

What is an allogeneic stem cell transplant?

Some people have a stem cell transplant using cells from a donor (another person). These are called '**allogeneic**' stem cell transplants. Allogeneic stem cell transplants are less commonly used for high-grade NHL than autologous stem cell transplants. They have a higher risk of complications and you need to be fit enough to have one safely. The donor stem cells produce a new **immune system** that can recognise and kill the lymphoma cells, reducing the risk of relapse. However, the donor cells can also attack your normal tissues.

Allogeneic stem cell transplants can offer a higher chance of cure than other treatments for some people with lymphoma that is difficult to treat.

Stem cell transplants take several weeks to complete and your recovery may take many months. They carry risks as well as benefits, particularly if you are having an allogeneic stem cell transplant. They are not suitable for everyone. If your doctors are thinking about this form of treatment for you, they will talk to you in detail about it.



Visit www.lymphoma-action.org.uk/SCT for more information about both autologous and allogeneic stem cell transplants or call our Information and Support Team on 0808 808 5555.

Maintenance treatment

If you have mantle cell lymphoma and are in remission after chemotherapy or a stem cell transplant, you might be given **maintenance** treatment to make your remission last as long as possible. Maintenance treatment works by 'mopping up' any lymphoma cells left after treatment that can't be detected on scans but could lead to relapse.

For mantle cell lymphoma, rituximab can be given as maintenance treatment every 2 months. You might have maintenance treatment for 2 or 3 years or for as long as it is keeping your lymphoma under control.

Most people tolerate maintenance treatment well, without significant side effects, but it isn't suitable for everyone. You and your doctor can decide together whether maintenance treatment is appropriate for you.

There is currently no evidence that maintenance treatment is beneficial for other types of high-grade NHL. Specific information for each type of high-grade NHL is provided on pages 112–134.

Supportive care

You have supportive care alongside your treatment for lymphoma to manage side effects and reduce symptoms, eg painkillers and antiemetics (anti-sickness drugs). The type of supportive care you need depends how you are affected by your lymphoma and its treatment.

- **Steroids** treat your lymphoma but can also control sickness and help you feel better.
- **Growth factors** boost your blood cell counts and reduce your risk of infection. The most common growth factor given is G-CSF, which boosts infection-fighting white blood cells called neutrophils.

- A **blood transfusion** may be given if you develop **anaemia** (a shortage of red blood cells).
- A **platelet transfusion** may be given if you develop **thrombocytopenia** (a shortage of platelets), especially if your platelet levels are very low or you are having problems with bleeding, eg nose bleeds.
- **Prophylactic medication** may be given to prevent certain unusual or serious infections that you are at higher risk of developing while your immune system is low due to the lymphoma or its treatment. These medications commonly include antibiotics (eg co-trimoxazole prevents *Pneumocystis jirovecii*, which causes a type of pneumonia), anti-viral drugs (eg aciclovir) and anti-fungal drugs (eg fluconazole or itraconazole). You take all of these drugs as tablets. Your doctor will tell you if you need them and for how long you should continue to take them.



Notes



At the end of treatment my doctor said they were very pleased with how things had gone. I wanted to hear the word 'cured', but my doctor explained that because of the nature of the disease, they could not put it in those terms. They emphasised though that everything was looking positive.

Roger, diagnosed with primary CNS lymphoma at 48

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When your course of treatment has finished, you will have a scan to check that your treatment has been successful.

Most people have a CT or PET/CT scan. If you had a bone marrow test before treatment that showed lymphoma in the **bone marrow**, this test may be repeated after treatment to check that your bone marrow is clear of lymphoma.

Remission and cure

There are different degrees of response to treatment:

- **A complete response** means that there is no sign of the lymphoma on scans or in the bone marrow or blood after treatment.
- **A partial response** means that the lymphoma has shrunk by at least half.

Sometimes changes in your body can still be seen after treatment, but that doesn't always mean there is active lymphoma. Symptoms and blood abnormalities may take time to resolve.

Remission is another way of describing response and means your lymphoma has shrunk (completely or partially) with treatment. Many doctors prefer to say 'you are in remission' rather than 'you are cured'. This is because they cannot be sure whether or not your disease will come back.

Some types of high-grade NHL stay in remission long-term once they go into complete remission. If lymphoma never comes back, then you are cured. However, other types are more likely to relapse after going into remission. Doctors treat most people with the aim of making the remission last as long as possible.

Follow-up

When you are in remission after treatment, you see your specialist or another member of the medical team regularly in the clinic. These follow-up appointments are important in supporting your recovery. They have several aims:

- to monitor how well you are recovering from treatment
- to help you manage side effects and to look out for late effects
- to check there are no signs of your lymphoma relapsing
- to give you a chance to raise concerns and ask questions.

At each appointment, you have a brief physical examination and may have blood tests. Unless there is a particular reason to do them, most people who had high-grade NHL are unlikely to have routine X-rays or scans. They are usually unnecessary and doctors prefer to keep your exposure to radiation to a minimum. People with high-grade NHL involving the brain may be offered regular MRI scans during follow-up (see page 28).

People who have had high-grade NHL usually have face-to-face follow-up appointments for 1 to 5 years after their treatment. You are likely to be seen at least once every 3–4 months at first. If you stay well, the appointments become less frequent. You may continue follow-up after 5 years. At the end of follow-up you may be discharged to the care of your GP.

Some hospitals offer remote follow-up after a period of face-to-face follow-up. You do not have to attend regular appointments but can be seen if you have any concerns or problems. Your doctor or specialist nurse will explain the follow-up arrangements at your hospital.

If you are worried about your health at any time, contact your lymphoma team to discuss your concerns.

If necessary, your team can arrange an early clinic appointment for you. Keep the contact details of your lymphoma team, even after you have finished treatment.

You might worry when your follow-up appointments are coming up. They are an inevitable reminder of your illness when you are trying to move on. Remember, these appointments are an important part of your care. They give you a chance to talk about anything that might be on your mind. It can help to write down what's bothering you when you think of it and take a list of questions with you to the appointment.

Questions to ask when treatment finishes

- Will I be on any treatment at all after the main course of treatment has finished?
- How often will I be seen in the clinic?
- What will happen at my follow-up appointments? Will I have any regular tests?
- Why won't I have regular scans?
- Is there anything I should look out for? How will I/you know if the lymphoma has come back?
- Who do I contact if I am worried about anything between appointments?



Notes

What is refractory lymphoma?

Most types of high-grade NHL respond well to the first treatment but, for a small number of people, the lymphoma does not respond. Lymphoma that does not go into remission after treatment is known as 'refractory' lymphoma. It is usually treated in the same way as relapsed high-grade NHL.

What is relapse?

Many people with high-grade NHL go into long-term complete remission after their first course of treatment. In some people the lymphoma relapses even after it has gone into complete remission.

Some types of lymphoma are more likely to relapse than others. Most people with the most common type of high-grade NHL, diffuse large B-cell lymphoma (DLBCL), stay in remission if their treatment is successful.

It is more common for some other types of high-grade NHL to relapse, eg:

- mantle cell lymphoma
- T-cell lymphoma.

Lymphoma is most likely to come back within 2 years of the end of your first treatment but it can happen later than this. Generally, over time, lymphoma is less likely to come back. If you do relapse, the lymphoma might come back where it was before or it might affect another part of your body.

If your doctor suspects your lymphoma has relapsed, you are likely to have all the tests you had done when you were first diagnosed, such as a **biopsy** and scans (see pages 21–37). If lymphoma relapses, it is important to check to see what type it is as sometimes it can change. It is also important to find out which parts of the body are affected. This allows your doctor to recommend the right treatment for you.

Treatment for relapsed or refractory high-grade NHL

Relapse of high-grade NHL can be frightening and upsetting, but many people can be treated successfully again. Treatment depends on:

- the type of treatment you've had before and how your lymphoma responded to it
- how well you coped with the treatment
- how quickly your lymphoma came back
- how fit you are at the time of your relapse.

If your lymphoma has relapsed or has not responded to treatment, you may have additional chemotherapy. If you are fit enough, this is likely to be stronger than your first treatment.

It is sometimes called 'salvage treatment'. You often have this type of treatment over a few days, while you stay in hospital.

If chemotherapy puts your lymphoma back into remission and you are fit enough, your doctor may suggest high-dose therapy and a stem cell transplant (see page 81) to give you the best chance of a long-lasting remission. You may also need radiotherapy, either before or after the **stem cell transplant**.

If you are not fit enough for intensive treatment, you might be able to have:

- less intensive chemotherapy or chemo-immunotherapy
- radiotherapy
- a newer targeted drug, possibly as part of a clinical trial.

Newer treatments for relapsed or refractory high-grade NHL

Some newer targeted drugs are already approved for use in people with high-grade NHL. Not all new drugs are funded by the NHS, but funding sources change all the time. Your doctor can tell you whether there are any targeted drugs available for your type of lymphoma.

Your doctor might suggest you enter a clinical trial. Doctors are always carrying out clinical trials to look for better treatments for high-grade NHL that has relapsed or has not responded to treatment. New treatments for lymphoma are often tried first in clinical trials in people with relapsed or refractory disease. Clinical trials can give you access to new, experimental treatments.



Visit Lymphoma TrialsLink at www.lymphoma-action.org.uk/TrialsLink to find out more about clinical trials and to find a trial that might be suitable for you.



Lymphoma – especially a rarer type – feels like a very isolating disease and I had not come across anyone with the same type as mine. I was so ill with the treatment. My Lymphoma Action buddy saved my life. She told me that it would not always be like this. She said that at some point I would look back and say ‘I don’t know how I got through this, but I did’. And she knew, because she’d got through it.

Tracey, diagnosed with primary mediastinal B-cell lymphoma at 42

Life during and after treatment for lymphoma

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This section gives a brief overview of things you might need to consider during your treatment and beyond. Our booklet *Living with lymphoma* gives more information on these topics, www.lymphoma-action.org.uk/LWL

It is hard to predict exactly how you will feel during your treatment and how it will affect your day-to-day life. Everyone reacts differently to treatment. Your initial symptoms might improve, but you might develop side effects, particularly as the treatment goes on. Some people have few side effects from their treatment and are able to carry on almost as usual. Others need to make changes, at least for a while. If you are having radiotherapy, side effects may be worse when you are near the end of your treatment course and for a short time afterwards.



I had a lot of psychological counselling. Before cancer, I would have been quite dismissive of this type of support, but I found it enormously helpful.

Ian, diagnosed with Burkitt lymphoma at 47

Many people have strong and difficult feelings at different stages: when they are diagnosed, during treatment and afterwards. It can help to talk about your feelings, especially during times when you are finding it harder to cope.

Your nurse specialist, or research nurse if you are on a clinical trial, is often a good person to talk to as they know the kind of feelings people often have. They can also give you advice on what to be careful of and tips on how to carry on with your life during your treatment and afterwards.

Local health and wellbeing events have been marvellous in finding out about services available – from therapies to support groups. NHL is an odd one, as I have found you don't fit a profile. It's not mentioned on TV and it doesn't have the PR, so people don't understand.

Ros, diagnosed with diffuse large B-cell lymphoma at 56



Working and studying

Most people need time off from work or study during their treatment. After treatment, some people need to reduce their hours or change the kind of work they do for a time.



Tips for work and study

- Let your employer, school or institution know about your illness and treatment so they can support you.
- Consider going back to work part-time initially or deferring part of your course at college or university.
- Find out whether you might be entitled to any benefits, eg at UK GOV: www.gov.uk/browse/benefits

Sex and contraception

Lots of people are less interested in sex than usual during their treatment but interest usually returns once you have recovered from treatment. If you have any concerns, talk to your medical team.

There is no reason you shouldn't have sex during treatment if you feel like it, but there are some specific precautions you should take.



Tips for safe sex

- Use condoms for 5 days after each chemotherapy treatment and avoid oral sex and open-mouthed kissing during this time.
- Use effective contraceptives as treatment could damage sperm or eggs and could harm a developing baby.
- Ask your medical team for advice on contraception – oral contraceptive tablets may be metabolised more quickly by your body when you're having treatment.

Advice does vary, but if you are having chemotherapy doctors often recommend that:

- women with lymphoma don't become pregnant during their treatment and for up to 2 years afterwards
- men with lymphoma prevent making their partner pregnant while they are having chemotherapy and for at least 3 months afterwards.

Everybody's circumstances are different. Discuss these issues with your medical team so they can give the best advice for you.

Hobbies and socialising

It is important that while you're being treated for lymphoma you allow yourself time to do the things you enjoy. When you feel well enough you should try to continue as much as possible with your hobbies and social life. This can help to make you feel more 'normal'.



Tips about hobbies and socialising

- You might need to avoid crowds because of the risk of infection. Your hospital team will give you advice about this.
- Check with your hospital team, especially if any of your hobbies are adventurous, very active, or dangerous.

Holidays and travel

Holidays and travel can be difficult during treatment, eg when your blood counts are low. After treatment, it is important that you know what to consider when making travel plans.



Tips for travel

- Discuss your plans well in advance with your medical team, so that they can offer you advice.
- Find out what vaccinations you need and if it is safe for you to have them.
- Travel insurance can be difficult to find and expensive, so factor this into your plans.

Feelings after treatment

Many people have mixed feelings when they finish treatment. This can come as a surprise if you're expecting to feel happy and relieved. Occasionally, people can feel more anxious and down once their treatment has finished, even if they are in remission.



A few weeks after the end of treatment, I hit the wall. My consultant had prepared me for this, but that didn't make it any easier. I had no energy or enthusiasm for anything and just wanted to sleep all the time.

Roger diagnosed with primary CNS lymphoma at 48

It is important to realise that these feelings are all natural, even if others expect you to feel differently. Talk to people, including your GP, medical team and specialist nurses, about how you are really feeling.



Our helpline team are here to listen. They may also be able to put you in touch with one of our buddies, who have all been affected by lymphoma, and whose experience you might relate to. Please call us on 0808 808 5555. Our website has forums for people to post questions and discuss topics, www.lymphoma-action.org.uk/Forum



I found writing a blog really therapeutic. It was a way of getting a lot of anger and fear off my chest. Writing the blog helped me get through the whole process and maintain a level of sanity.

Kat, diagnosed with double-hit lymphoma at 32



Helping yourself

Many people find that having a serious illness makes them reassess their lifestyle. There are many things you can do to help yourself to cope with treatment and to help yourself recover afterwards. These changes may help you to live a longer and healthier life after treatment.



Tips for looking after yourself

- Drink plenty of liquids, especially if you are having chemotherapy.
- Eat a healthy diet and keep your body at a healthy weight; if you are having problems eating or are losing weight because of your treatment, ask your medical team for advice.
- Stop smoking; lung infections are more common with chemotherapy. Your risk of developing long-term side effects of treatment is also higher if you smoke.
- Protect your skin from the sun.
- Exercise regularly; exercise can help to reduce fatigue and make you feel better in general. Ask your specialist nurse if there are any post-treatment exercise programmes you can join.



I tried to run throughout my treatment on days I felt strong enough, but I often had to settle for long walks instead.

Bernard, diagnosed with diffuse large B-cell lymphoma at 60

You may want to look at other aspects of your life, too, such as your responsibilities, your job or finances and how you spend your free time. Many people find having lymphoma makes them value the simple things in life, such as spending time with family and friends and doing the activities they enjoy.

When someone close to you has lymphoma

When someone you care about has lymphoma, it can be a difficult time for you, too. You may feel helpless watching the person go through all the tests and treatments. You may feel you don't know what to do or how to help.

There are many things you can do – you can find some suggestions on the next page. Don't forget to take care of yourself, too. If you become run-down or ill, you will struggle to support someone else.

You probably have many of the same feelings as your loved one and need time to deal with them, too. Talk to someone – friends, family, or a specialist – if you are finding it difficult to cope.

People sometimes worry that they don't know what to say to the person affected by an illness or that they might say the wrong thing. Just being ready to listen is often a huge help. Let the person with lymphoma know you will care for them in whatever way you can.

Tips for how you might help friends or loved ones with lymphoma



- Provide transport to hospital.
- Go to hospital appointments with them to help remember what is being said.
- Help with shopping or preparing meals.
- Take care of other family members.
- Encourage them to spend time seeing other people or doing things they enjoy when they are able to.
- Organise fun things to do when they feel up to it.
- If they are not well enough for visitors, keep in touch by sending messages.



Notes



Notes

Types of high-grade NHL

This part of the booklet looks in more detail at the most common types of high-grade NHL.

We would suggest that, at least at first, you read only the section on your own type of high-grade NHL. If you are not sure exactly what kind of lymphoma you have, check with your doctor. It may be confusing or distressing to read about illnesses that are not relevant to you.

We have not been able to give details of every type of high-grade NHL. If you have been told you have a type of lymphoma that you do not see listed in this booklet, you may wish to check with your doctor. We may have listed your lymphoma under another name. If not, your doctor might be able to tell you if we have included a lymphoma similar to yours.

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Diffuse large B-cell lymphoma (DLBCL)

DLBCL is the most common type of high-grade NHL. Nearly half of all diagnosed cases of high-grade NHLs are DLBCL.

There are different subtypes of DLBCL, eg germinal centre B-cell (GCB) and activated B-cell (ABC) and there are some rare types of DLBCL. Research is studying whether different treatments work better for certain types of DLBCL, but most people with DLBCL are currently treated in the same way.

Who gets it?

Most people diagnosed with DLBCL are 65 or over, but DLBCL can develop at any age and is slightly more common in men. Sometimes, low-grade (slow-growing) NHL can change (or 'transform') into DLBCL.

What are the symptoms?

Most people have a lump or swelling that is easily felt. However, it is quite common for DLBCL to develop in **lymph nodes** deep inside the body or at **extranodal** sites so people can have different symptoms.

How is it treated?

Most people have chemo-immunotherapy (chemotherapy and antibody therapy). The most commonly used regimen is R-CHOP (see page 62).

People with early-stage DLBCL (not extranodal) might have a shorter course of chemo-immunotherapy. They usually have radiotherapy after their chemo-immunotherapy if the affected areas are not far apart. If you have advanced-stage DLBCL, you are only likely to have radiotherapy if you had **bulky disease** before treatment or you have localised disease left after initial treatment.

If you have DLBCL that has spread to your **central nervous system (CNS)** or is at high risk of spreading to your CNS, you have other chemotherapy regimens and/or **intrathecal** chemotherapy (see page 60). Some people who have DLBCL that is not cured after R-CHOP may be offered further treatment. This may include a **stem cell transplant** if you are fit enough.

Rare types of DLBCL

There are several rare types of DLBCL that can cause different symptoms to the most common type of DLBCL and sometimes need more intensive treatment.

Primary mediastinal large B-cell lymphoma develops in the **thymus** and can cause a large swelling in your chest. It usually affects younger people, around the age of 35, and most commonly women. You may be offered more intensive chemo-immunotherapy, or R-CHOP may be given more frequently, eg in 2-weekly cycles. Most people then have radiotherapy.

ALK-positive large B-cell lymphoma is a very rare type of lymphoma where the cells have a mutation that makes them express a protein called anaplastic large-cell kinase (ALK) on their surface. They don't usually have the CD20 protein, so rituximab might not be used as part of your treatment. It usually causes swollen lymph nodes but the lymphoma can grow outside the lymph nodes, eg in your chest.

Double-hit and triple-hit lymphoma are types of lymphoma, usually DLBCL, where the lymphoma cells have 2 (double-hit) or 3 (triple-hit) major lymphoma-related changes in their genes. They can be difficult to treat; you might have intensive chemo-immunotherapy.

Grey zone lymphomas are B-cell lymphomas with features of more than 1 type of lymphoma, usually DLBCL (usually primary mediastinal large B-cell lymphoma) and classical Hodgkin lymphoma (cHL). You might hear them called 'unclassifiable' or 'intermediate'. You are most likely to have very enlarged lymph nodes in your chest, but the lymphoma can develop in other places. There is no standard chemotherapy regimen for grey zone lymphomas – your doctor chooses a regimen based on your individual circumstances.

T-cell/histiocyte-rich large B-cell lymphoma mainly affects middle-aged men but can affect men and women of any age. It can look like Hodgkin lymphoma under a microscope but it is important it is diagnosed correctly. It usually causes

swollen lymph nodes, swelling of the liver and/or **spleen** and sometimes **B symptoms**. Most people have R-CHOP.

Intravascular large B-cell lymphoma develops in capillaries (small blood vessels). Symptoms depend on where it develops but can include nervous system symptoms, like confusion, seizures, dizziness or weakness, reddened patches or lumps in the skin, and **B symptoms**. It is very rare and occurs most often in people in their 60s. Most people have R-CHOP.

Some very rare forms are often associated with **HIV**, eg plasmablastic lymphoma, but they can occur in people without HIV (see page 134).

Burkitt lymphoma

Burkitt lymphoma is a very fast-growing type of lymphoma that needs intensive treatment, which is usually successful.

Who gets it?

Burkitt lymphoma is generally uncommon in older adults. It is the most common type of NHL in children and also often affects younger adults.

People with **HIV** are more likely to develop Burkitt lymphoma, but most people with Burkitt lymphoma do not have HIV.

What are the symptoms?

Symptoms often develop quickly, over just a few days or weeks. Burkitt lymphoma usually causes lots of large **lymph nodes** in many different parts of the body, and often involves your abdomen (tummy) and bowel. Other organs like your spleen and liver may be affected. The lymphoma may be found in the **bone marrow** and can spread to your central nervous system (CNS).

How is it treated?

Burkitt lymphoma develops quickly and needs treatment immediately.

- Most people have a combination of rituximab with strong chemotherapy drugs, eg CODOX-M/IVAC.
- Some people, eg those with lower-risk Burkitt lymphoma or who can't have stronger treatment, may be offered less intensive treatment, such as DA-EPOCH-R, possibly together with methotrexate.

Your doctor might suggest a different regimen (combination of drugs), particularly if you are not well enough to have certain drugs. Drugs that reach your CNS, including **intrathecal chemotherapy**, are usually given as part of your treatment as Burkitt lymphoma can affect your CNS.

You are likely to have to stay in hospital for most of your intensive treatment, which takes several months. Treatment is given through a **central line** (see page 58).

Often a large number of lymphoma cells are killed very quickly when this type of therapy is started. This can cause tumour lysis syndrome – serious chemical imbalances caused by the chemicals released by dying cells. This can cause problems, particularly with your kidneys, so drugs like allopurinol and rasburicase (Fasturtec®) are used to protect the kidneys.

Mantle cell lymphoma

Mantle cell lymphoma can grow slowly or quickly. Most cases grow quickly, even though the cells can resemble a low-grade lymphoma. Like low-grade lymphomas, mantle cell lymphoma is considered incurable and usually **relapses** (comes back).

Who gets it?

Mantle cell lymphoma is about twice as common in men as in women and occurs most often in people in their 60s.

What are the symptoms?

Mantle cell lymphoma usually causes swollen **lymph nodes** but has often spread to other areas of the body by the time it is diagnosed. It may be found in the **bone marrow**, bloodstream, bowel, **spleen**, tonsils or rarely in the **central nervous system**.

How is it treated?

Most people are treated with chemotherapy together with rituximab (chemo-immunotherapy), eg R-CHOP or R-bendamustine. If you are fit enough, chemotherapy is likely to include a drug called cytarabine. If you respond to this treatment and are fit enough, your doctor might suggest an **autologous stem cell transplant** to make your remission last longer.

After chemo-immunotherapy or a stem cell transplant, you may have **maintenance** rituximab.

People with localised disease might have radiotherapy.

Some people have a slow-growing form of mantle cell lymphoma and might be monitored without treatment until the lymphoma gets worse. This is called 'active monitoring' or 'watch and wait' and is often used for low-grade lymphomas. Treatment can sometimes be put off for a few years without any harm. This avoids the side effects of treatment for as long as possible.

Primary central nervous system lymphoma (including primary intraocular lymphoma)

Some types of lymphoma occur only in the **central nervous system (CNS)** – this is called primary CNS lymphoma. Primary intraocular lymphoma or vitreoretinal lymphoma starts in the eye. Primary brain and eye lymphomas are usually a type of diffuse large B-cell lymphoma (DLBCL), but other types occasionally occur.

Who gets it?

Most people affected are middle-aged or older.

What are the symptoms?

Lymphoma growing in the brain can cause symptoms like limb weakness or loss of sensation in a particular area, changes in personality, behaviour or vision, memory or balance problems, confusion, seizures and headache. Several areas of the brain are usually affected. An MRI scan with contrast is usually the best type of scan to look at the brain.

How is it treated?

CNS lymphoma needs prompt treatment. You usually have steroids first to improve your symptoms. Most people then have intensive chemotherapy that includes methotrexate (which crosses the **blood-brain barrier**) and rituximab. If you are fit enough, you might have the MATRix regimen. After chemotherapy, you may have high-dose therapy and a **stem cell transplant**, or sometimes radiotherapy to your whole brain.

Peripheral T-cell lymphoma not otherwise specified (PTCL-NOS)

Around a third of all cases of T-cell lymphomas are diagnosed as PTCL-NOS. These are lymphomas that don't fit into another category, but whose symptoms and treatment are similar.

Who gets it?

PTCL-NOS can occur at any age, but it is more common to be first diagnosed in people around the age of 60. It is more common in men.

What are the symptoms?

Most people with PTCL-NOS have enlarged **lymph nodes** in one or more places, often felt in the neck, armpit or groin. It can be found in the **bone marrow** and **extranodal** areas too and can cause an enlarged liver or **spleen** and itchy red patches on the skin. **B symptoms** are common.

How is it treated?

Clinical trials are trying to establish the best treatment for T-cell lymphomas. The most common chemotherapy regimen is CHOP but other regimens (eg CHOEP) are also used.

PTCL-NOS commonly **relapses** so your doctor might recommend a **stem cell transplant** if you are fit enough, and your lymphoma has been reduced enough by chemotherapy.

Anaplastic large cell lymphoma (ALCL)

ALCL can be ALK-positive or ALK-negative ALCL, depending if a protein called 'anaplastic large-cell kinase (ALK)' is present. A low-grade cutaneous form only affects the skin.

Who gets it?

ALK-positive ALCL often affects people under 35. ALK-negative ALCL often affects older adults aged 40 to 65. Both types are more common in men.

What are the symptoms?

Enlarged **lymph nodes** and **B symptoms** are common. ALK-positive ALCL often affects **extranodal** sites, like the skin, lungs, liver, bone and **bone marrow**. This is less common in ALK-negative ALCL.

How is it treated?

Most people have CHOP chemotherapy, but treatment depends on several factors, eg your age, the stage of your lymphoma, and its ALK status. ALK-positive ALCL is less likely to relapse than other types of T-cell lymphoma. More intensive chemotherapy might be used for some people with ALK-negative ALCL, which can be more difficult to treat. Some people might have a stem cell transplant after chemotherapy.

Angioimmunoblastic T-cell lymphoma (AITL)/ follicular T-cell lymphoma (FTCL)

AITL and FTCL are thought to develop from the same type of cell and are currently treated in the same way.

Who gets it?

AITL/FTCL usually occurs in older people, with an average age of around 60. It affects slightly more men than women.

What are the symptoms?

AITL/FTCL is often fast-growing and causes systemic symptoms (affecting your whole body) so you might feel generally unwell. Infections and autoimmune reactions can be caused by the lymphoma cells producing abnormal antibodies. Most people have several enlarged **lymph nodes**, fever, rash and **anaemia**. Other symptoms might include **B symptoms**.

Most people with AITL are diagnosed at an advanced stage, but people with FTCL are more likely to be diagnosed at an earlier stage.

How is it treated?

Most people have CHOP chemotherapy, but your doctor might recommend a different regimen.

AITL/FTCL commonly **relapses** so your doctor might recommend a **stem cell transplant** if you are fit enough, and your lymphoma has been reduced enough by chemotherapy.

Enteropathy-associated T-cell lymphoma (EATL)

There are 2 types of EATL:

- **Type 1, classical EATL**, makes up the vast majority of cases. It occurs in people with coeliac disease, which is an autoimmune condition where your body attacks substances inside gluten (found in grains like wheat, barley and rye) causing damage to your small bowel. Some people are only diagnosed with coeliac disease when they are diagnosed with EATL.
- **Type 2, monomorphic EATL** (or monomorphic epitheliotropic intestinal T-cell lymphoma). It is not known what causes Type 2 EATL.

What are the symptoms?

EATL develops in the small bowel (part of your intestines). Bowel and stomach problems are typical, including abdominal pain, weight loss, and diarrhoea. Symptoms may be severe if you have ulcers in your bowel or bowel perforation (a hole through the wall of your bowel).

How is it treated?

People with EATL are often very unwell by the time they are diagnosed so treatment can be difficult. CHOP chemotherapy is often used as the first cycle of treatment. If possible, you may then have a more intensive regimen (with ifosfamide and methotrexate) and possibly a **stem cell transplant**.

Adult T-cell leukaemia/lymphoma (ATLL)

ATLL only occurs in people with human T-lymphotropic virus type 1 (HTLV-1) – a virus that is rare in the UK but more common in some other parts of the world. There are 2 aggressive types of ATLL (lymphoma-type and acute) and 2 slower-growing types (chronic and smouldering).

Who gets it?

ATLL develops in about 1 in 20 people with HTLV-1, usually many years after they got the infection. It is mainly spread through breast milk but can also be spread through blood transfusions and sexual intercourse.

What are the symptoms?

Symptoms of aggressive types of ATLL can come on very quickly. You might have lots of enlarged **lymph nodes**. Other common symptoms include an enlarged liver and **spleen**, skin rash, night sweats, fevers and high levels of calcium in the blood, which can cause heart and kidney problems.

How is it treated?

Most people have CHOP chemotherapy but a more intensive regimen and a **stem cell transplant** might be recommended if you are fit enough. Some people at high risk of lymphoma in their **CNS** have chemotherapy that crosses the **blood-brain barrier**. Many people have anti-viral treatment like zidovudine (Retrovir®) and alpha-interferon.

Extranodal NK/T-cell lymphoma, nasal type

Extranodal NK/T-cell lymphoma develops at **extranodal** sites, most often the nose. It can develop from T cells or another type of lymphocyte called 'natural killer (NK)' cells.

Who gets it?

This type of lymphoma is extremely rare in the UK. It affects more men than women, at an average age of around 50. It is linked with the Epstein–Barr virus (EBV), but the vast majority of people with EBV do not develop lymphoma.

What are the symptoms?

A mass most often forms inside the nose or in the sinuses (air-filled spaces) around the nose. Symptoms include a blocked nose, discharge or bleeding from your nose, weepy eyes, facial swelling, problems swallowing and problems with your teeth. In some cases it is more widespread and involves other sites, eg the bowel or skin. **B symptoms** are common.

How is it treated?

Most people with localised disease have radiotherapy to the affected area. Chemotherapy is usually given alongside and after radiotherapy. People with widespread lymphoma usually have chemotherapy alone. Chemotherapy regimens (combinations of drugs) that include the drug L-asparaginase are usually recommended, such as VIDL and SMILE. Some people then have a **stem cell transplant**.

Lymphoblastic lymphoma

Lymphoblastic lymphoma (LBL) differs from other types of T-cell lymphoma because it develops from an immature (unspecialised) T cell called a lymphoblast rather than a T cell that has matured to have a specific function.

B-cell lymphoblastic lymphoma is less common.

Who gets it?

This is a rare lymphoma that is most common in young people in their late teens or 20s, particularly boys and young men.

What are the symptoms?

LBL most often causes swelling of **lymph nodes** inside the chest around the heart, in an area known as the mediastinum. This can squash organs and structures in the same area, causing symptoms like a cough, shortness of breath or problems with blood circulation.

Some people have other symptoms like fatigue and **B symptoms**. Lymphoma cells in the **bone marrow** can cause low **blood counts**.

How is it treated?

LBL is treated like acute leukaemia, with chemotherapy split into phases:

- **Remission induction:** to get rid of enlarged lymph nodes that can be seen on scans. This takes several weeks. You have to stay in hospital for a lot of this time.
- **Consolidation:** to kill lymphoma cells left behind. This involves cycles of chemotherapy over a few months. You usually have this as an outpatient but might need to stay in hospital for some of the time.
- **Maintenance:** to prevent the lymphoma coming back. You have it as an outpatient. Most people have 2 years of chemotherapy tablets but you may have **intravenous** chemotherapy. Some people have a **stem cell transplant** instead.

Treatment usually includes **intrathecal** chemotherapy (see page 60), which reaches your **central nervous system**.

Non-Hodgkin lymphomas associated with immunodeficiency

People with immunodeficiency (a weakened immune system) are more likely to develop certain types of lymphoma.

This includes people with **HIV** and those who have had immunosuppressive drugs (drugs that dampen down the immune system) for an organ transplant.

If your NHL is associated with an immunodeficiency, it is very important that your lymphoma team work closely with your other medical teams, eg HIV team or transplant team, to ensure you get the most appropriate treatment for both conditions.

Post-transplant lymphoproliferative disorder (PTLD)

PTLD is a proliferation (rapid increase) of lymphoid (immune) cells that can occur if you are taking immunosuppressive drugs after an organ or allogeneic **stem cell transplant**.

The risk is generally small but varies depending what type of transplant you've had. PTLD might resolve if you reduce immunosuppressive drugs, particularly if it is at an early stage. Some types of PTLD can be aggressive (fast-growing).

What are the symptoms?

Most people have a painless lump in the neck, armpit or groin, but a lump can develop in areas deep within the body, where you won't be able to see it or feel it, including at the transplanted organ. General symptoms like fever and night sweats might occur and can be mistaken for signs of transplant rejection.

How is it treated?

The first treatment is normally to reduce immunosuppression, if possible. For early PTLD, this might be enough to clear the abnormal cells. In most cases of PTLD, other treatments are needed as well as reducing immunosuppression. Rituximab might be given alone or with chemotherapy, eg CHOP.

HIV-related lymphoma

People with **HIV** are more likely to develop non-Hodgkin lymphoma than people without HIV. Any type of lymphoma can develop, but the most common are Burkitt lymphoma and diffuse large B-cell lymphoma (DLBCL). Some very rare types of lymphoma are more common in people with HIV, eg:

- primary effusion lymphoma, which grows in the cavities in your body without forming a mass.
- plasmablastic lymphoma, which usually grows in the mouth or throat. The lymphoma cells don't have CD20 so you might not have rituximab treatment.

What are the symptoms

Enlarged **lymph nodes** are usually the first symptom. Many people with HIV have lymphoma that grows in their abdomen (tummy) or bowel, which might cause pain, swelling, nausea, vomiting or diarrhoea. **B symptoms** are common.

People with HIV are more likely than others to be diagnosed when their lymphoma is at an advanced stage or is found outside of lymph nodes (**extranodal**).

How is it treated?

People with HIV can normally have standard treatments for the type of lymphoma they have, but also need to take anti-retroviral therapy (ART) and supportive treatments to reduce their risk of infection, eg growth factors and antibiotics.

Glossary

Allogeneic using someone else's tissue

Anaemia shortage of red blood cells or haemoglobin in the blood

Anaesthetic drugs given to make a part of the body numb (a local anaesthetic) or put the whole body to sleep (a general anaesthetic)

Antibody an immune system protein that sticks to disease-causing cells or organisms, such as bacteria, leading to their death

Autologous using a person's own tissue

B symptoms 3 particularly significant symptoms of lymphoma – fevers, night sweats and unexplained weight loss

Biopsy a test that takes some cells to be looked at under a microscope

Blood count a blood test that counts the cells in your blood, including the red blood cells, the different kinds of white blood cells, and platelets

Blood-brain barrier A barrier of cells and blood vessels that protects the brain from harmful chemicals and infections

Bone marrow spongy material at the centre of larger bones, which produces our blood cells

Bulky disease very enlarged lymph nodes

Central line a hollow tube inserted into a vein deep inside you to give treatment

Central nervous system (CNS) the brain and spinal cord

Erythrocytes red blood cells, which carry oxygen around the body

Extranodal lymphoma outside of the lymphatic system

HIV human immunodeficiency virus, a virus that causes weakness in part of the immune system leading to AIDS (acquired immune deficiency syndrome)

Immune system the parts of the body that fight off and prevent infection

Infusion treatment given intravenously through a pump or drip

Intrathecal into the fluid around the spinal cord

Intravenous into a vein

Late effects side effects that can persist or develop months or years after treatment has finished

Lymph node gland that acts like a filter in the lymphatic system; involved in fighting infection

Lymphocyte specialised white blood cells that help fight infection; including B lymphocytes (B cells) and T lymphocytes (T cells)

Lymphopenia shortage of lymphocytes

Maintenance treatment to keep lymphoma in remission after successful treatment

Neutropenia shortage of neutrophils in the blood, which makes you more prone to infection

Neutrophil a type of white blood cell that is important in fighting infections caused by bacteria or fungi

Platelets tiny fragments of cells in your blood that help form blood clots and stop bleeding

Prophylaxis/prophylactic medication a treatment given to prevent an illness or problem developing in the future

Red blood cell a cell that contains haemoglobin, which allows it to carry oxygen around the body

Refractory lymphoma that hasn't responded well to treatment

Relapse lymphoma that comes back after treatment

Spleen an organ of the immune system involved in fighting infection and filtering the blood

Stem cell transplant the process of giving back previously harvested stem cells (an autologous stem cell transplant) or of giving donated stem cells (an allogeneic stem cell transplant).

Subcutaneous underneath the skin

Thrombocytopenia shortage of platelets in the blood

Thymus a gland in your chest where T cells mature

White blood cell a cell found in the blood and in many other tissues that helps our bodies to fight infections; there are several different kinds including lymphocytes and neutrophils

Information and support

If you'd like to talk to someone about anything to do with lymphoma (including how you feel) get in touch.



Call our Freephone helpline Monday to Friday on 0808 808 5555. You can also use Live Chat on our website



Come to one of our support groups. Find one near you at www.lymphoma-action.org.uk/SupportGroups



Join our online forum to chat with others who are affected by lymphoma



Get in touch with a buddy, someone affected by lymphoma



Visit www.lymphoma-action.org.uk/TrialsLink to find clinical trials that might be suitable for you



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On our website, you'll find a list of other organisations you may find helpful. There are many other organisations offering specialised help.

How you can help us

We continually strive to improve our resources for people affected by lymphoma and are interested in any feedback you might have about this booklet. Please visit our website at www.lymphoma-action.org.uk/Book-Feedback or email us at publications@lymphoma-action.org.uk with any comments. You can also call our helpline on 0808 808 5555.



We produce other publications that give information about lymphoma and what to expect from treatment. Visit our website at www.lymphoma-action.org.uk or call our Information and Support Team on 0808 808 5555 for more information.

References

The full list of references is available on request. Please email publications@lymphoma-action.org.uk or call 01296 619409 if you would like a copy.

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Notes



Lymphoma Action is the UK's only charity dedicated to lymphoma, and has been providing in-depth, expert information and support for over 30 years.

To make a gift towards our work, please visit www.lymphoma-action.org.uk/Donate

Thank you

This booklet will help you understand more about high-grade non-Hodgkin lymphoma (NHL). It describes what high-grade NHL is, how it typically affects people, how it is treated and what to expect during and after treatment.

Lymphoma Action is a charity that has been providing information and support to people affected by lymphoma for over 30 years. We're here for you.



Helpline (freephone) **0808 808 5555** (Mon to Fri, 10am to 3pm)



Email **information@lymphoma-action.org.uk**



Visit **www.lymphoma-action.org.uk**



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