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The lymphatic system

Lymphoma is a cancer of the lymphatic system. The lymphatic system is part of your immune system, which helps protect you from infection. It is spread throughout your body, like blood vessels, and it has many different parts. This page tells you about the different parts of the lymphatic system and what they do.

On this page

What is the lymphatic system and what does it do?

The lymphatic system runs throughout the body, like your blood circulatory system. The lymphatic system carries a fluid called '**lymph**' around the body in lymph vessels (tubes). The fluid passes through **lymph nodes** (glands), which are spread throughout your body.

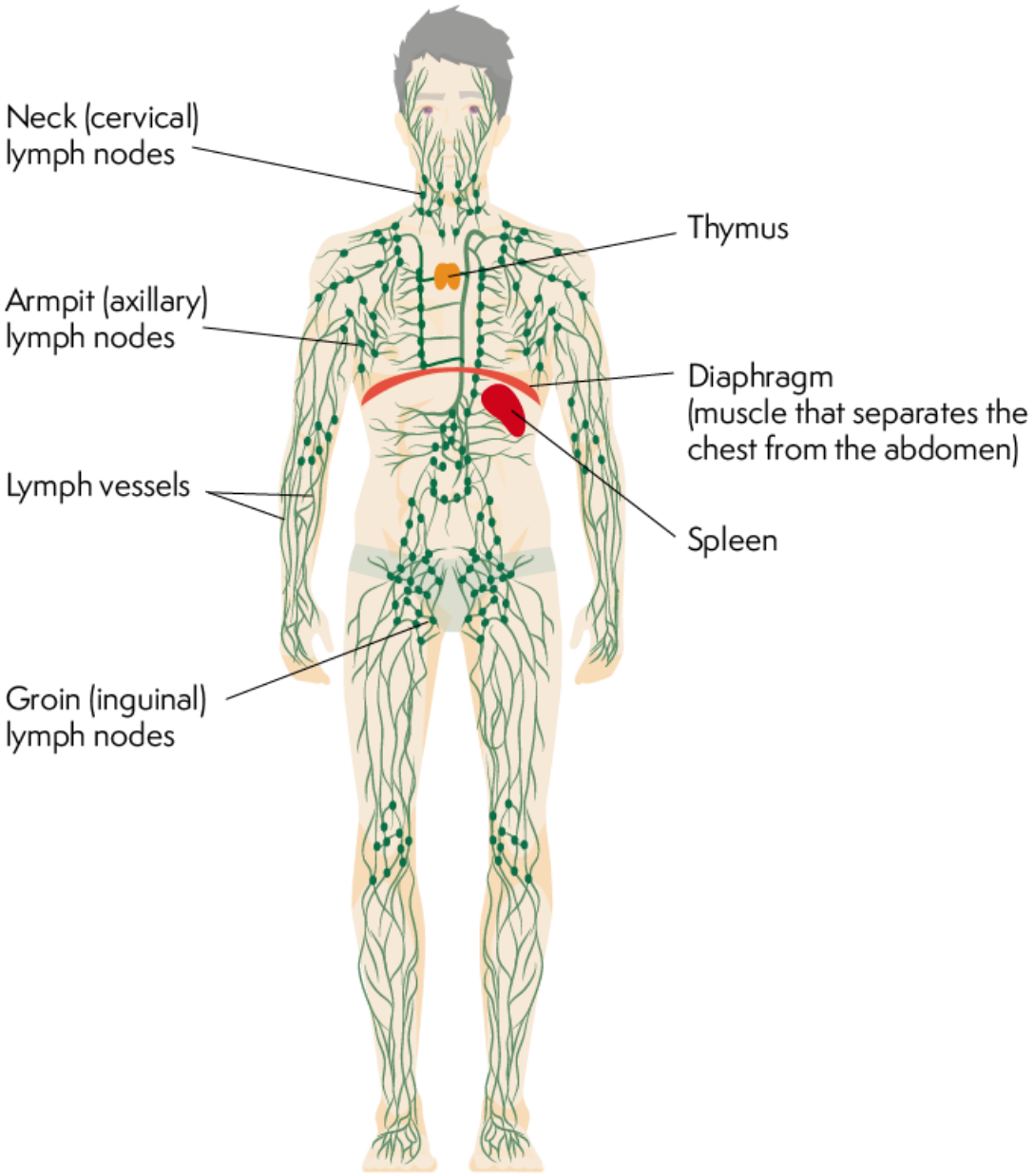


Figure: The lymphatic system (lymph vessels and lymph nodes are shown in green)

The lymphatic system also includes organs and tissues that are places where immune system cells collect. These include the parts of the body that make cells for the immune system:

- the **bone marrow**
- the **thymus**.

They also include areas where immune cells collect, ready to fight infection:

- **lymph nodes**
- the **spleen**
- the **tonsils and adenoids**
- **mucosa-associated lymphoid tissue**.

The lymphatic system defends your body against disease by removing germs (bacteria, viruses and parasites) and toxins (poisons). It also helps to destroy cells that are old, damaged or have become abnormal. It has other important functions too:

- As a drainage system, it removes excess fluid and waste from your tissues and returns it to your bloodstream.
- It helps to absorb fats and fat-soluble vitamins from your digestive system and to transport them to your bloodstream.

The whole of the lymphatic system helps to protect us against infection. Any part of it can be affected by lymphoma.

Lymph

Lymph is a clear fluid that flows around the body in the lymphatic system. It is formed from plasma. Plasma is carried around your body in your blood vessels. It leaks out of the blood vessels and bathes your tissues and supplies the cells of your body with nutrients. Most of this plasma then drains back into the blood vessels. A small amount is left behind, together with:

- waste products from the cells
- fat that is broken down in the bowel and needs to be carried to larger blood vessels
- things that have got into the body and might be harmful, such as germs and toxins
- damaged or abnormal cells, including cancer cells.

This all drains into tiny lymph vessels. Lymph vessels in the small intestine also absorb fats and fat-soluble vitamins.

When it is in lymph vessels, the fluid is known as 'lymph'.

The lymph flows from the tiny lymph vessels into larger lymph vessels, heading towards one of two lymphatic ducts. The lymph filters through **lymph nodes** as it flows around your body. The lymph nodes contain lots of lymphocytes (white blood cells that fight infection). Anything that doesn't belong in your body, and any damaged and abnormal cells are removed in the lymph nodes. Lymph leaving the lymph nodes also carries lymphocytes. These lymphocytes can fight infections elsewhere in the body if needed.

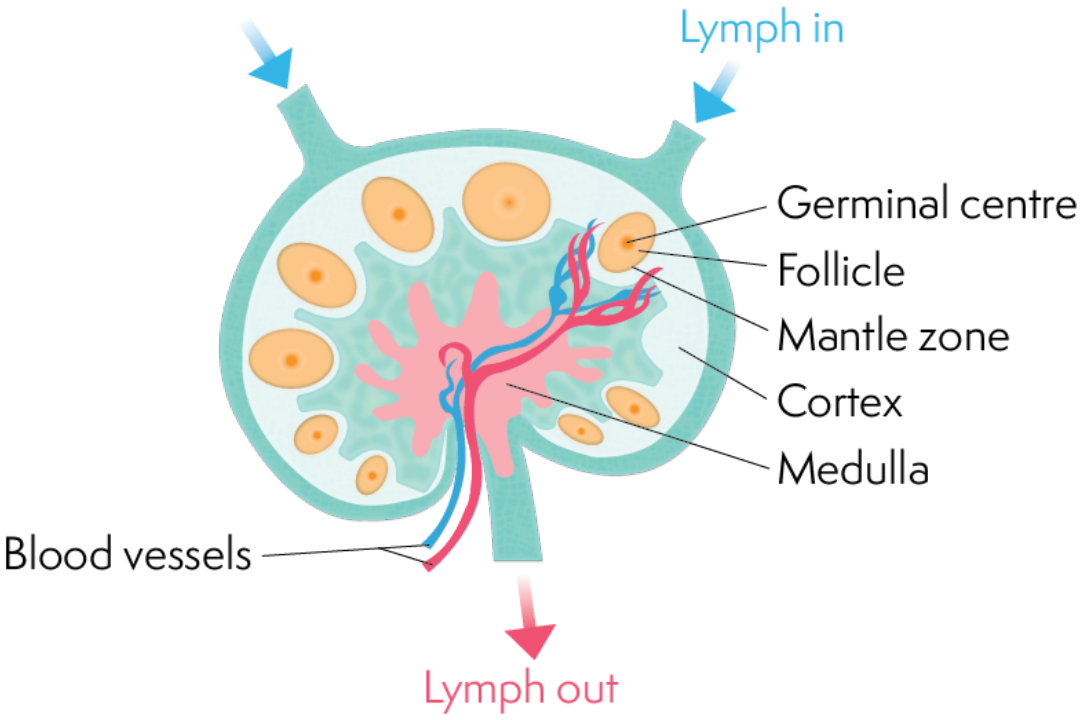
When the lymph reaches the lymphatic ducts, it goes into your bloodstream, draining into the large veins close to your heart. This removes excess fluid from around your body, helping to maintain your blood pressure and to avoid swelling.

Unlike blood, lymph is not pumped around your body by the heart. Instead, it is pushed along when your lymph vessels are squeezed by your muscles, and by gravity if the vessel is above the heart. It is a one-way system: valves stop any lymph flowing backwards.

Lymph nodes

Lymph nodes are small, bean-shaped structures. They are usually around 1cm long, although this can vary depending on where they are in the body. There are thousands of them throughout the body.

Lymph nodes filter the **lymph** from nearby parts of the body.



Structure of a lymph node

Where are lymph nodes found?

There are lymph nodes at various points along the lymph vessels. They are often grouped together. **There are groups of lymph nodes all around your body**, except your brain and spinal cord. For example, groups of lymph nodes are found in the:

- neck (cervical nodes)
- armpits (axillary nodes)
- groin (inguinal nodes)
- centre of the chest between the lungs (mediastinal nodes)
- abdomen, which is your tummy area.

Some lymph nodes can be felt from the outside if they swell up, for example those in the neck, armpit or groin. If these lymph nodes swell, you might be able to feel a lump in that area. This often happens if you have an infection and is not usually a sign of something serious. There are also lots of lymph nodes deep within your body. These lymph nodes can't be felt from the outside but can be seen on **scans**.

How do lymph nodes work?

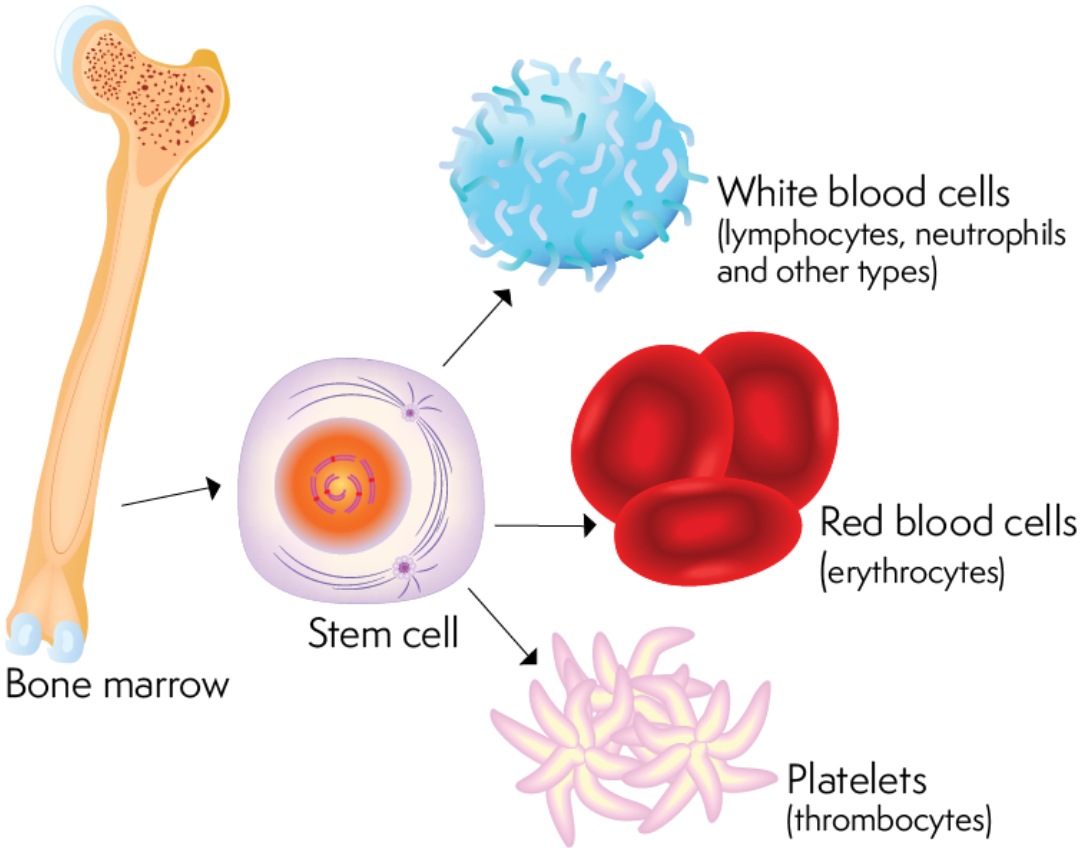
The lymph nodes filter the lymph passing through them. They trap germs (for example, bacteria) and cells of the **immune system** that give information about a nearby infection.

If there are signs of an infection, your body makes more lymphocytes to help fight the infection. As the number of lymphocytes builds up, the lymph nodes along the lymph vessels that drain the infected area swell. For example, an infection in the throat can cause the lymph nodes in your neck to swell.

When the infection has been destroyed, most of the immune system cells that were made in response to the infection die off. The lymph nodes normally return to their usual size in a couple of weeks. Most swollen lymph nodes are due to infections. If lymphoma cells collect in the l**ymph nodes**, the swelling does not go down.

Bone marrow

Bone marrow is the spongy material at the centre of many of your bones. It makes all the new blood cells you need, including red blood cells, platelets and the different white blood cells.



Bone marrow and the blood cells it produces

White blood cells are involved in the fight against infection. Lymphocytes are white blood cells that are part of the lymphatic system. They are the cells that become abnormal in lymphoma.

There are two types of lymphocytes: B lymphocytes (B cells) and T lymphocytes (T cells). Both are made in the bone marrow, then live throughout the lymphatic system.

Thymus

The thymus is a small, butterfly-shaped gland in your chest. It sits **behind your breastbone**, just above your heart. It grows until puberty and then gradually shrinks in adults. T cells develop into fully working T cells in the thymus. When fully developed, they enter the bloodstream and lymphatic system.

As adults, T cells are maintained through division of mature T cells outside of the central lymphoid organs.

Spleen

The spleen is a pear-sized organ that lies just **under your rib cage** on the left-hand side of your body, behind your stomach.

The spleen filters blood, much like **lymph nodes** filter **lymph**. **Immune system cells** that live in your spleen remove germs, and old and damaged cells from your blood.

Tonsils and adenoids

Your tonsils and adenoids are at the back of your throat and nose. They contain lots of **immune system cells** that help protect your body against infections that enter through the mouth and nose.

Mucosa-associated lymphoid tissue

Mucosal tissue is the soft, moist, protective tissue that lines many parts of your body, for example your mouth, gut, breathing passages and other internal organs.

Mucosa-associated lymphoid tissue (MALT) is an area in the mucosa where lymphocytes and other **immune system cells** collect together. MALT can be found in the wall of the bowel (where it is known as 'Peyer's patches') and in other organs, such as the lungs, eyes, nose and the thyroid gland.

MALT helps protect the body from infections and toxins entering through a part of the body lined by mucosa. The immune cells in MALT fight the infection or remove any toxins from your body.

MALT can form when healthy lymphocytes collect in tissue outside lymph nodes in response to an infection or inflammation (a reaction to injury,

irritation or infection). This is a normal process. However, **MALT lymphomas** can develop when abnormal lymphocytes collect in this lymphoid tissue.

The lymphatic system and lymphoma

Lymphocytes are part of the **lymphatic system** and are spread throughout the body. When lymphocytes become abnormal, **lymphoma** can develop. Lymphoma can therefore develop in almost any part of the body. It is also easy for lymphoma to spread throughout the body in the lymphatic system. Unlike other cancers, most people with lymphoma have it in more than one place when they are diagnosed. Lymphoma that is in lots of places in the body can be successfully **treated** and often cured.

References

These are some of the sources we used to prepare this information. The full list of sources is available on request. Please contact us by email at **publications@lymphoma-action.org.uk** or phone on **01296 619409** if you would like a copy.

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Further reading

- The immune system
- What is lymphoma?
- Glossary

Acknowledgements

- We would like to thank the Expert Reviewers and members of our Reader Panel who gave their time to review this information.

Content last reviewed: February 2018
Updated: April 2018
Next planned review: February 2021

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