

Neutropenia

Neutropenia means that there aren't enough neutrophils (a type of white blood cell) in your blood. White blood cells are important in fighting infections. Many people with lymphoma – and other cancers – are affected by neutropenia at some point during their illness and treatment. Having neutropenia increases your risk of getting an infection. You may be interested in our separate information page about [risk of infection](#), including [signs of infection](#).

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Neutropenia

Neutropenia means having a lower than normal number of a type of white blood cell called a **neutrophil**. You might also hear medical staff call this condition a 'low neutrophil count' or a 'low white cell count'. If you have neutropenia, you are described as 'neutropenic'.

Neutrophils are part of your body's **immune system**. They circulate in your bloodstream and **lymphatic system** and they are important in fighting infections.

There are two main reasons people with lymphoma might get neutropenia: lymphoma in the **bone marrow** and a **side effect of treatment**.

- If lymphoma cells are in the bone marrow, they take up space that is normally used to produce healthy blood cells. This can lower the number of neutrophils your body makes because they are 'crowded out' by the lymphoma cells.

- Although the aim of **treatment** is to kill lymphoma cells, some healthy cells may also be destroyed as a side effect, including blood cells that are developing in the bone marrow (such as neutrophils). This can happen with many types of chemotherapy and some radiotherapy treatments.

Neutropenia itself doesn't usually cause symptoms. It is diagnosed with the regular blood tests you have during your lymphoma treatment.

If you have a low number of neutrophils, you are more likely to get **infections**. How likely you are to develop an infection depends on how low your neutrophil count is. If it's only slightly below your normal level, your risk of infection isn't much higher than usual. Your chances of getting an infection go up as your neutrophil level goes down.

If you have neutropenia, contact your medical team straight away if you notice any signs of infection.

How many neutrophils should I have?

The number of neutrophils in your blood is measured by a blood test called a **full blood count** (FBC). Your result will be compared to a reference range, or normal range. This is the range of values found in healthy people.

Different hospitals sometimes use slightly different reference ranges. Ranges can also vary between groups of people – for example, black people and people of Middle Eastern descent tend to have naturally lower numbers of neutrophils in their blood than white people.

The normal range for neutrophils is usually between 2 billion and 7.5 billion neutrophils per litre of blood. To make these large numbers easier to manage, they are written down as $2.0 \times 10^9/L$ to $7.5 \times 10^9/L$. Doctors usually refer to them just by the number – for example, a neutrophil count of 0.7 or 4.2.

In general, neutropenia is classified as follows:

- neutrophil count 1.0–2.0: slightly low
 - neutrophil count 0.5–1.0: low
 - neutrophil count 0.2–0.5: very low
 - neutrophil count less than 0.2: extremely low.
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Effects of neutropenia

If you have neutropenia, your **risk of developing an infection** is higher than normal. The lower your neutrophil count, the higher your risk of infection:

- slightly low neutrophil count: little change in your risk of infection
- low neutrophil count: slightly higher than normal risk of infection
- very low neutrophil count: infections common
- extremely low neutrophil count: infections likely.

Infections can start anywhere in your body but they most often affect your airways, digestive system, bladder and reproductive system. They can also affect your skin.

If your neutrophil count is low, your body can't fight an infection as well as it would normally. It also means you might not get the usual **signs of infection** (for example, swelling, redness or warmth). However, fever is often present.

It is important to seek medical attention if you develop any signs of infection while neutropenic.

Neutropenic sepsis

Sepsis is a serious, whole-body reaction triggered by an infection. In people with neutropenia, who are less able to fight infection, it can develop much more quickly than normal. This is called 'neutropenic sepsis' or 'febrile neutropenia'. It can be life-threatening and it must be treated urgently.

Your medical team will diagnose neutropenic sepsis if you have:

- a **neutrophil count** less than 0.5 **and either**
- a temperature higher than 38°C **or**
- other signs or symptoms of sepsis:
 - chills and shivering
 - a fast heartbeat or breathing
 - clammy, cold, pale or mottled skin
 - dizziness, confusion, disorientation or slurred speech
 - diarrhoea, nausea or vomiting
 - weeing less than usual
 - loss of consciousness.

You can have sepsis without having a high temperature. This is sometimes called 'cold sepsis'.

You are more likely to have neutropenic sepsis without a high temperature if your **chemotherapy regimen** includes steroids because these can mask fevers and hide infection. For this reason, your doctors may also carry out other checks. They might measure your heart rate, blood pressure, breathing rate, and kidney and liver function.

Contact your medical team straight away if you have any signs of infection.

When am I most at risk of neutropenia?

Depending on the strength of your **chemotherapy regimen**, your neutrophil count is usually lowest about 7–12 days after you have had chemotherapy, although it could stay low for longer.

Your haematology team checks your neutrophil count before each chemotherapy cycle. If your neutrophil count is too low, your next cycle of chemotherapy might be delayed until you have enough neutrophils. This could just be a day or two later than planned but it could be longer.

If you are on chemotherapy, contact your medical team straight away if you notice any signs of infection.

Treatment for neutropenia

If your neutrophil count is low because of chemotherapy, you might not need any treatment for neutropenia. Your neutrophils may naturally return to a safe level within a few days.

Prophylactic (preventative) treatment

Sometimes doctors recommend a regular, small dose of medicines to lower the risk of infection. These might be:

- antibiotics (drugs that fight infections caused by bacteria, such as skin infections, tonsillitis or pneumonia)
- anti-viral medicines (drugs that fight infections caused by viruses, such as flu, chicken pox or shingles)
- anti-fungal medicines (drugs that fight infections caused by fungi, such as thrush).

You might have them for just a short time while your neutrophil count is expected to be at its lowest.

With certain **chemotherapy** drugs, your **risk of infection** is higher. This is because of the effects of the drugs on the **immune system** as a whole rather than on your level of neutrophils. If you are taking one of these drugs, your doctor will prescribe a low dose of antibiotics. You may need to carry on taking them for some time after your chemotherapy has finished to give your immune system time to recover.

Preventative treatment can lower your risk of infection but it cannot prevent all infections.

Contact your hospital immediately if you have any signs of infection even if you are taking antibiotics.

If you develop an infection, you will need treatment with higher doses of other antibiotics, usually given intravenously (into a vein).

Growth factors (G-CSF)

If you are neutropenic and your doctor thinks you have a high risk of infection, or if your neutrophil count is too low for you to have the chemotherapy dose you need, you might be given a 'growth factor'. Growth factors are hormones (chemical messengers) that occur naturally in our bodies. The growth factor most commonly used is called granulocyte-colony stimulating factor (G-CSF). This is a protein that triggers the **bone marrow** to make certain white blood cells. G-CSF helps your neutrophil levels return to normal more quickly after chemotherapy, which lowers your risk of infections. We have more information on **having growth factors** and **potential side effects of growth factors**.

Neutropenic diet

You might have heard of a 'neutropenic diet' (sometimes called a 'clean', 'low-bacterial' or 'low microbial' diet). The aim of this type of diet is to cut out foods that are more likely to contain infection-causing bacteria and fungi. There is limited scientific research supporting neutropenic diets and advice varies between hospitals. You may be advised to avoid certain foods or you may not be given any dietary restrictions at all.

Ask your medical team if there are any specific foods you should avoid and make sure you follow [normal food safety precautions](#).

The neutropenic diet below is based on the advice of the [Association of UK Dietitians](#). It varies according to your neutrophil count.

Dietary advice for people with neutrophil count between 0.5 and 2.0 x 10⁹/L

Dairy products

Avoid:

- all unpasteurised dairy products
- soft cheeses made with unpasteurised milk
- mould-ripened cheeses such as Camembert, Brie and goats' cheese
- blue cheeses
- probiotic or 'bio' yoghurts or yoghurt-drinks.

Alternatives:

- pasteurised milk, soya milk, Jersey milk or UHT milk
- cheeses made with pasteurised milk
- processed cheeses
- vacuum-packed cheeses
- hard cheeses such as Cheddar and Edam
- yoghurts or yoghurt-drinks that are not probiotic or 'bio'.

Meat and fish

Avoid:

- raw or undercooked meat or poultry
- smoked meats (including salami)
- raw or lightly-cooked fish or shellfish
- smoked salmon.

Alternatives:

- well-cooked meat or poultry
- tinned meat or fish
- vacuum-packed cold meats (stored in the fridge)
- vacuum-packed fish eaten straight from the packet.

Eggs**Avoid:**

- raw or undercooked eggs
- products containing raw or undercooked eggs (for example, home-made mayonnaise, ice cream, mousse, egg-nog, meringue)
- sauces or dressings containing raw or undercooked eggs (for example, Hollandaise sauce, Bearnaise sauce, Caesar salad dressing).

Alternatives:

- hard-boiled eggs
- shop-bought mayonnaise
- products containing pasteurised eggs.

Paté**Avoid:**

- meat and vegetable patés.

Alternatives:

- pasteurised patés
 - pastes in jars or tins that don't need to be refrigerated.
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Additional advice for people with severe neutropenia (neutrophil count less than $0.5 \times 10^9/L$)

Fruit, nuts and vegetables

Avoid:

- raw, unpeeled fruit and vegetables, including salad
- raw dried fruit and products containing raw dried fruit
- damaged or over-ripe fruit or vegetables
- unpasteurised or fresh fruit or vegetable smoothies
- fresh nuts
- nuts in shells.

Alternatives:

- good quality, cooked and peeled fruit and vegetables
- UHT or longlife fruit juices
- pasteurised smoothies
- tinned fruit or nuts
- cooked dried fruit
- cooked or roasted nuts
- peanut butter.

Dairy

Avoid:

- ice cream from ice cream vans.

Alternatives:

- ice cream in sealed, single-serving tubs.

Water

Avoid:

- non-drinking water
- bottled water
- spring water or well water
- water from water coolers or drink fountains
- ice in restaurants or slush drinks.

Alternatives:

- freshly-run tap water
- carbonated water
- ice from appropriate water sources.

Miscellaneous

Avoid:

- uncooked herbs, spices and pepper
- unpasteurised or farm-fresh honey or honeycomb
- deli-counter foods
- large packets or jars of food that won't be consumed in one go
- pick-and-mix sweets.

Alternatives

- cooked herbs, spices and pepper
 - pasteurised or heat-treated honey
 - single-serving, individual packets of food or sweets.
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 - National Institute for Health and Care Excellence. Neutropenic sepsis: prevention and management of neutropenic sepsis in cancer patients. September 2012. Available at www.nice.org.uk/guidance/cg151 (Accessed May 2018).
 - The Association of UK Dietitians. Policy statement: neutropenic dietary advice for haematology patients. British Dietetic Association, May 2016.
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Further reading

- Risk of infection
 - Blood tests
 - Chemotherapy
 - Treatment for low blood counts
 - Diet and nutrition
 - Immune system
 - Glossary
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