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## Immunosuppression (Weak immune system)

Immune suppression describes a loss of immune function. It can occur for many reasons, including disease, medication, surgery, age or genetics.

### What is immunosuppression?

Immunosuppression, also known as immune suppression or immunocompromise, means the immune system isn't working as well as it normally would. This includes any or all of the defences that make up the immune system - particularly the white cells in the bloodstream, the spleen and the lymph nodes.

When this system is suppressed, ie not working as it should, it leaves people more vulnerable to infection.

Someone who is immunosuppressed is more likely to need antibiotics or hospital admission for a bacterial infection. Most people who are immunosuppressed can't have live vaccines and they may need to take special precautions when travelling.

Immunosuppressed people are also more vulnerable to certain skin cancers.

### What is the immune system?

Millions of bacteria, viruses and other germs (microbes) surround all of us all of the time. Some are actively helpful - for instance, it would be impossible to digest food without 'friendly' [gut bacteria which live in everyone's gastrointestinal tract](#). Most are harmless unless they get into part of the body they are not designed to be in - and it's the job of our immune system to stop that happening.

The immune system – the body's defence against disease-causing microbes (pathogens) – can be divided into:

- Lines of first defence (skin, saliva, the mucous membrane lining the nose, acidic stomach juices, etc).
- Specially adapted white blood cells called lymphocytes.
- Other types of white blood cells.
- The lymphatic system (a network of tubes and glands – lymph nodes or glands – which carry a fluid called lymph containing cells called lymphocytes).

See also the separate leaflet called [The Immune System](#) for more information.

## What causes immunosuppression?

The following can be causes of immunosuppression:

- **Age.** Immune systems become less effective during ageing. This is sometimes known as immunosenescence.
- **Persisting (chronic) disease.** Immune systems tend to become less effective as certain long-term illnesses progress. Examples include severe [chronic kidney disease](#), chronic liver disease and [diabetes mellitus](#).
- **Malnutrition.**
- **Medicines for illness caused by the immune system attacking itself** (autoimmune diseases). Examples include [rheumatoid arthritis](#) and [Crohn's disease](#).
- **Medicines in the form of oral steroids** where treatment is needed to reduce inflammation.
- **Medicines taken to prevent rejection** in people who have had organ (usually liver, heart or kidney) or bone marrow transplants.
- **Chemotherapy or radiotherapy treatment for cancer.**

- **Cancers.** Certain cancers can cause immune suppression, particularly those which involve the blood cells crucial to the immune system. Lymphomas, leukaemias and [myeloma](#) are the cancers which tend to suppress the immune system.
- **Not having a spleen,** due to its having been removed (splenectomy) or having a spleen which does not work as well as normal. This can occur due to certain conditions such as [sickle cell anaemia](#), [thalassaemia major](#) or lymphoma, or after radiotherapy.
- **HIV and AIDS.** The human immunodeficiency virus (HIV) affects the immune system.
- **Rare genetic conditions** which result in loss of immune function – for example, severe combined immunodeficiency syndrome (SCID), DiGeorge's syndrome, Wiskott-Aldrich syndrome.

## Which medicines cause immunosuppression?

Oral steroids are a common cause of immunosuppression and are used in numerous conditions. They are more likely to lower the immune defences when used at high doses for long periods of time.

Lower doses do not generally cause a significant problem. For an adult, a dose of 40 mg per day of [prednisolone](#) for more than a week may cause immunosuppression, but this dose varies for other steroids and for children. [See the separate leaflet called Oral Steroids for more information.](#)

Other medicines which suppress the immune system include:

- [Azathioprine.](#)
- [Mycophenolate mofetil.](#)
- Monoclonal antibodies – of which there are many ending in "mab", such as bevacizumab, rituximab and trastuzumab.
- Anti-TNF drugs such as [etanercept](#), infliximab, adalimumab, certolizumab and golimumab. (TNF stands for anti tumour necrosis factor, and some of the "mab" medicines above act against TNF, so there is some overlap in groups of medicines here.)
- [Methotrexate.](#)

- [Ciclosporin](#).
- [Tacrolimus](#).
- [Sirolimus](#).
- [Cyclophosphamide](#).
- [Leflunomide](#).

These medicines are used to treat all sorts of conditions, some of the more common ones including:

- Cancers such as lymphoma or leukaemia.
- Rheumatoid arthritis.
- Crohn's disease.
- [Ulcerative colitis](#).
- Organ transplants, to prevent rejection.
- Severe [psoriasis](#) and [psoriatic arthritis](#).

## Symptoms of immunosuppression

Most immunosuppressed people have no symptoms. They may be prone to getting infections more frequently, and those infections may be more severe and severe complications may develop more frequently.

Immunosuppressed people are more likely to develop unusual or uncommon infections. For example, healthy adults do not usually get [thrush in the oesophagus](#). For people with AIDS, however, thrush is common and may be very widespread or severe.

## Complications of immunosuppression

Infections can develop and spread particularly quickly in people whose immune systems are suppressed. People are more likely to get spread of any infection to the whole body ([sepsis](#)), which can make them dangerously ill.

People who have immunosuppression also seem to be at higher risk of certain types of skin cancer. This includes:

- Squamous cell carcinoma (SCC).
- Melanoma.
- Kaposi's sarcoma.

It is not entirely known for sure why this is. It may be because the immune system helps to destroy skin cells which have been damaged by the sun. These cells, if not removed by the immune system, may go on to multiply and cause cancer. It may also be that viruses (such as human papillomavirus - HPV, or herpes viruses) involved in some cancers are more likely to be present if the immune system is suppressed. Some immune-suppressing medicines may directly affect skin cells in a way which makes them more likely to develop skin cancers.

## **When to see a doctor for immunosuppression**

The immune system of healthy people can fight off most minor infections within days without any medical input. That's why with most minor infections, healthy people are encouraged to take a wait-and-see approach. This means treating the symptoms and seeking medical advice if they feel very unwell or the infection is not starting to settle on its own after a week or so.

In someone with immunosuppression, however, even a mild infection can become serious very quickly. Infections caught early can be treated quickly, preventing them from spreading. Someone who is immunosuppressed is more likely to be given an antibiotic for a mild infection compared with someone who is not immunosuppressed.

People on immunosuppressant medication and those undergoing active cancer treatment should be advised by their specialist team when to seek medical help. Many people who have had a splenectomy or who have a poorly functioning spleen will be on regular antibiotics or will be aware when to seek medical attention. Most people in the UK with HIV are on medication which means their immune system is no longer suppressed and, therefore, are not usually more at risk of infections; however, this may not be the case for people living with HIV in all parts of the world.

A medication called carbimazole which is used to treat an over-active thyroid gland can suppress one particular white blood cell. People on this medication will have been advised to seek urgent medical help if they have a sore throat as an urgent blood test would be needed.

People with certain immunosuppressant conditions or on particular immunosuppressant medications were advised to be started on anti-viral medications if they had a positive covid test. This can normally be accessed by a central covid team in each area of the UK.

It is important to seek urgent medical attention if immunosuppressed and:

- Having a [high temperature \(fever\)](#) over 38°C.
- Having chills or shakes ([rigors](#)).
- Feeling generally unwell with dizziness or drowsiness or confusion.
- Having a new or unusual rash.
- [Experiencing the light hurting the eyes.](#)
- Having fits (seizures).

All this also applies to children who are immunosuppressed but medical attention should also be sought urgently for an immunosuppressed child who is breathing rapidly or not eating or drinking as normal.

An immunosuppressed person who develops any scaly areas which don't clear up quickly with a good moisturising cream, or a new mole or one which has changed, should seek medical advice..

## Can immunosuppression be treated?

It all depends on the cause. In some cases it can be treated, in others it is managed. For example:

- HIV infection and AIDS are treated with specific anti-HIV medication. See the separate leaflet called HIV and AIDS.
- Many cancers can be successfully treated, or at least their progression delayed, with chemotherapy.

- Stem cell (or bone marrow) transplants are used in some situations. Damaged cells are replaced with normal ones. This is used in some forms of cancer, as well as some genetic immunosuppression conditions.
- Immunosuppression caused by medication should reverse if the medication is stopped. If the immunosuppression is causing harm then sometimes an alternative can be used or the dose changed. In other cases, infection can be quickly managed as and when it occurs, while the medication is continued.
- People who have had a splenectomy have lifelong immunosuppression but there are ways of reducing the risk of infection (see section below).
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- In some conditions, such as genetic immune disorders, injections of antibody proteins (immunoglobulins) can be given to help the body fight infection.

## How is immune suppressant medication monitored?

This varies with the individual medication. Some medicines require regular blood tests. These monitor your [blood cells \(white cells, red cells and platelets\)](#) and check that the numbers aren't getting too low. There may also be blood tests to check the medication isn't affecting [the liver](#) or [kidney function](#).

For other immune-suppressing medication, a regular blood test might be advised to see how well it is working.

It may also vary over time. For example, for some medicines, such as [methotrexate](#), initial blood tests will be very frequent (every one to two weeks), but this will reduce to every 12 weeks once the medication dose is stable.

Monitoring requirements will be advised by the specialist initiating this medication.

## Why would the spleen be removed?

The spleen is an important part of your immune system but sometimes it needs to be removed with an operation called a splenectomy. This may be necessary after an accident or an injury where the spleen is ruptured (which would lead to significant blood loss if not treated quickly).

Sometimes the spleen becomes too large and destroys too many blood cells. Examples where this occurs and the spleen may need to be removed include:

- [Immune thrombocytopenia](#).
- Hereditary spherocytosis.
- Hereditary elliptocytosis.
- Lymphomas and leukaemias.

See the separate leaflets called [Spleen Pain](#) and [Preventing infection after Splenectomy](#) for more information about the spleen.

## Travelling with immunosuppression

It is wise to plan very carefully for travel due to the risks of infection. All travel vaccinations which are advised for the particular destination should be had in good time (although certain live vaccines might be advised against).

Caution should be employed travelling to countries with high risk of diseases that cannot be vaccinated against. Equally it is best to avoid going to places where good medical care is difficult to access in case of an emergency. It is important to travel with information about the condition and/or medication in case this needs to be seen by a health professional when travelling.

It is important to check that the travel insurance is adequate for every condition and / or medication. "In case" antibiotics are no longer recommended as it is always best to seek medical help at the time of need.



It is important to take the usual precautions to avoid [food poisoning/traveller's diarrhoea](#) if visiting somewhere this might be a risk, and to use plenty of high-factor sun cream to protect the skin.

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## Further reading

- [Immunisation against infectious disease - the Green Book \(latest edition\)](#); UK Health Security Agency.
- [Immunosuppression](#); Travel Health Pro Fact Sheet
- [Splenectomy](#); Public Health England, January 2015
- [Skin cancer in transplant recipients](#); DermNet NZ
- [Immunosuppressive Drugs](#); Hussain

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