

# Why vaccination is safe and important

Vaccines are the most effective way to prevent infectious diseases. This page explains how vaccines work, what they contain and the most common side effects.

If you're looking for coronavirus (COVID-19) vaccination information, you can read about:

- the COVID-19 vaccines (Link: [www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/coronavirus-vaccine/](http://www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/coronavirus-vaccine/))
- COVID-19 vaccination side effects and safety (Link: [www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/safety-and-side-effects/](http://www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/safety-and-side-effects/))

## Video: vaccines - are they safe for my child?

In this video, a GP reassures a parent about vaccinations for her child.

## Be aware of anti-vaccine stories

Anti-vaccine stories are often spread online through social media.

They may not be based on scientific evidence and could put your child at risk of a serious illness.

## Things you need to know about vaccines

### Vaccines:

#### Do

- ✓ protect you and your child from many serious and potentially deadly diseases
- ✓ protect other people in your community – by helping to stop diseases spreading to people who cannot have vaccines
- ✓ undergo rigorous safety testing before being introduced – they're also constantly monitored for side effects after being introduced
- ✓ sometimes cause mild side effects that will not last long – some children may feel a bit unwell and have a sore arm for 2 or 3 days
- ✓ reduce or even get rid of some diseases – if enough people are vaccinated

#### Don't

- ✗ do not cause autism – studies have found no evidence of a link between the MMR vaccine and autism
- ✗ do not overload or weaken the immune system – it's safe to give children several vaccines at a time and this reduces the amount of injections they need
- ✗ do not cause allergies or any other conditions – all the current evidence tells us that vaccinating is safer than not vaccinating
- ✗ do not contain mercury (thiomersal)
- ✗ do not contain any ingredients that cause harm in such small amounts – but speak to your doctor if you have any known allergies such as eggs or gelatine

## Why vaccines are important

Vaccination is the most important thing we can do to protect ourselves and our children against ill health. They prevent up to 3 million deaths worldwide every year.

Since vaccines were introduced in the UK, diseases like smallpox, polio and tetanus that used to kill or disable millions of people are either gone or seen very rarely.

Other diseases like measles and diphtheria have been reduced by up to 99.9% since their vaccines were introduced.

However, if people stop having vaccines, it's possible for infectious diseases to quickly spread again.

The World Health Organization (WHO) has listed vaccine hesitancy as one of the biggest threats to global health.

Vaccine hesitancy is where people with access to vaccines delay or refuse vaccination.

## Measles and mumps in England

Measles and mumps are starting to appear again in England, even though the MMR vaccine is safe and protects against both diseases.

Measles and mumps cases have nearly doubled in recent years:

### Measles and mumps cases in England

Year	Measles	Mumps
2016	530	573
2018	970	1061

This is serious as measles can lead to life-threatening complications like meningitis, and mumps can cause hearing loss.

### Important

If 95% of children receive the MMR vaccine, it's possible to get rid of measles.

However, measles, mumps and rubella can quickly spread again if fewer than 90% of people are vaccinated.

# How vaccines work

Vaccines teach your immune system how to create antibodies that protect you from diseases.

It's much safer for your immune system to learn this through vaccination than by catching the diseases and treating them.

Once your immune system knows how to fight a disease, it can often protect you for many years.

## Herd immunity

Having a vaccine also benefits your whole community through "herd immunity".

If enough people are vaccinated, it's harder for the disease to spread to those people who cannot have vaccines. For example, people who are ill or have a weakened immune system.

Read more about herd immunity and who it protects on the Oxford University Vaccine Knowledge Project website (Link: <http://vk.ovg.ox.ac.uk/herd-immunity>)

## Why vaccines are safe

All vaccines are thoroughly tested to make sure they will not harm you or your child.

It often takes many years for a vaccine to make it through the trials and tests it needs to pass for approval.

Once a vaccine is being used in the UK it's also monitored for any rare side effects by the Medicines and Healthcare products Regulatory Agency (MHRA) (Link: <https://www.gov.uk/government/organisations/medicines-and-healthcare-products-regulatory-agency>).

Anyone can report a suspected side effect of vaccination to the MHRA through the Yellow Card Scheme (Link: <https://yellowcard.mhra.gov.uk/>).

Read about how vaccines are licensed, tested and monitored on the Oxford University Vaccine Knowledge Project website (Link: <http://vk.ovg.ox.ac.uk/vaccine-development>)

## Who cannot have vaccines

There are very few people who cannot have vaccines.

Generally, vaccines are only not suitable for:

- people who've had a serious allergic reaction (anaphylaxis) (Link: [www.nhs.uk/conditions/anaphylaxis/](http://www.nhs.uk/conditions/anaphylaxis/)) to a previous dose of the vaccine

- people who've had a serious allergic reaction to ingredients in the vaccine

People with weakened immune systems (for example, because of cancer treatment or a health condition) may also not be able to have some vaccines.

If you're not sure if you or your child can be vaccinated, check with a GP, practice nurse, health visitor or pharmacist.

## Side effects of vaccination

Most of the side effects of vaccination are mild and do not last long.

The most common side effects of vaccination include:

- the area where the needle goes in looking red, swollen and feeling a bit sore for 2 to 3 days
- babies or young children feeling a bit unwell or developing a high temperature (Link: [www.nhs.uk/conditions/fever-in-children/](http://www.nhs.uk/conditions/fever-in-children/)) for 1 or 2 days

Some children might also cry and be upset immediately after the injection. This is normal and they should feel better after a cuddle.

## Allergic reactions

It's rare for anyone to have a serious allergic reaction to a vaccination. If this does happen, it usually happens within minutes.

The person who vaccinates you or your child will be trained to deal with allergic reactions and treat them immediately. With prompt treatment, you or your child will make a good recovery.

Read vaccination tips for parents, including what to expect after vaccination (Link: [www.nhs.uk/conditions/vaccinations/vaccination-appointment-tips-for-parents/](http://www.nhs.uk/conditions/vaccinations/vaccination-appointment-tips-for-parents/))

## Speak to your GP or practice nurse if:

- you're worried about you or your child having a vaccine
- you're not sure if you or your child can have a vaccine

You could also ask a health visitor any questions you have about vaccines.

## Coronavirus (COVID-19) update: how to contact a GP

It's still important to get help from a GP if you need it. To contact your GP surgery:

- visit their website
- use the NHS App (Link: [www.nhs.uk/using-the-nhs/nhs-services/the-nhs-app/](http://www.nhs.uk/using-the-nhs/nhs-services/the-nhs-app/))
- call them

Find out about using the NHS during COVID-19 (Link: [www.nhs.uk/conditions/coronavirus-covid-19/social-distancing/using-the-nhs-and-other-health-services/](http://www.nhs.uk/conditions/coronavirus-covid-19/social-distancing/using-the-nhs-and-other-health-services/))

## What's in a vaccine?

Most people are not concerned about vaccine ingredients and know that they are safe.

The main ingredient of any vaccine is a small amount of bacteria, virus or toxin that's been weakened or destroyed in a laboratory first.

This means there's no risk of healthy people catching a disease from a vaccine. It's also why you might see vaccines being called "live" or "killed" vaccines.

## What's the difference between a live or killed vaccine?

## Live and killed vaccine comparison

Live (weakened) vaccines	Killed (destroyed) vaccines
Contain viruses or bacteria that have been weakened	Contain viruses or bacteria that have been destroyed
Cannot be given to people with a weakened immune system	Can still be given to people with a weakened immune system
Gives long-term protection	Often needs several doses or a booster vaccine for full protection

## Other vaccine ingredients

Vaccines sometimes contain other ingredients that make the vaccine safe and more effective.

There's no evidence that any of these ingredients cause harm when used in such small amounts.

### [Aluminium \(adjuvant\)](#)

#### Is it safe?

Adjuvants are added to vaccines in very small amounts, which have been shown to be safe. They might cause minor reactions, such as a small temporary lump or redness at the injection site.

We come into contact with aluminium all the time. It's found naturally in very small amounts in:

- almost all foods
- drinking water
- breast milk
- baby formula milk

It's also used in medicines, such as antacids, and in food packaging.

Although small amounts of aluminium from these everyday sources can build up in the body, they're not believed to be harmful to our health. Our bodies do not use aluminium and it's gradually eliminated in our pee.

There's no evidence that the levels of aluminium we come across every day increase the risk of conditions like dementia or autism.

The amount of aluminium used in killed vaccines is very, very small. No harmful effects have been seen with vaccines that contain an aluminium-based adjuvant.

## What is it?

Aluminium is a very common metal that's been used safely in vaccines for more than 70 years.

Most killed vaccines contain a very small amount of aluminium-based adjuvant to:

- help to boost our immune response
- make the vaccine more effective and long-lasting
- reduce the amount of antigen needed in a vaccine
- sometimes reduce the number of doses that need to be given

### [Squalene oil \(adjuvant\)](#)

## Is it safe?

Adjuvants are added to vaccines in very small amounts, which have been shown to be safe.

They might cause minor reactions, such as a small temporary lump or redness at the injection site.

## What is it?

Squalene oil is the adjuvant added to the trivalent flu vaccine (Link: <https://www.nhs.uk/conditions/vaccinations/flu-influenza-vaccine/>) for adults aged 65 and over.

It comes from fish oil and is highly purified before being used in the flu vaccine.

Adjuvants are added to some vaccines to:

- help to boost our immune response
- make the vaccine more effective and long-lasting
- reduce the amount of antigen needed in a vaccine
- sometimes reduce the number of doses that need to be given

### [Pork gelatine](#)

## Is it safe?

There have been a small number of allergic reactions to vaccines containing gelatine. Speak to your doctor first if you have a known allergy to gelatine.

Some religious groups, such as Muslims and Jews, may be concerned about using vaccines containing gelatine from pigs. But many faith group leaders have stated the use of gelatine in vaccines is acceptable and does not break any religious rules.

Read this NHS leaflet about vaccines and porcine gelatine (Link: <https://www.gov.uk/government/publications/vaccines-and-porcine-gelatine>)

## What is it?



Gelatine derived from pigs is used as a stabilising agent in some vaccines to:

- help protect vaccines from the effects of heat or freeze-drying
- help maintain the shelf life of the vaccine

The only vaccines containing gelatine in the UK routine vaccination schedule are:

- the shingles vaccine
- the children's nasal flu vaccine
- 1 of the 2 types of MMR vaccine

## [Human serum albumin and recombinant albumin](#)

### **Are they safe?**

Yes, they are considered safe. Human serum albumin used in vaccines comes from screened blood donors. The manufacturing process ensures there is no risk of transmitting any diseases.

Recombinant albumin does not contain any human or animal products.

### **What are they?**

Human serum albumin is a substance from human blood. It's used to stabilise a chickenpox vaccine called Varilix and maintain its quality during storage.

Recombinant albumin is produced by cells, such as yeast cells, that have had the gene for human albumin inserted into them.

The cells are then able to generate large quantities of human serum albumin without any need to extract it from human blood.

Recombinant albumin may be used in very small amounts as a stabiliser in 1 of the MMR vaccines used in the UK (MMRVaxPro).

## [Egg protein](#)

### **Is it safe?**

Children and adults with a severe egg allergy can safely receive the MMR vaccine.

Children and adults with an egg allergy are advised to have either:

- an egg-free inactivated flu vaccine
- a vaccine with a very low egg protein (ovalbumin) content

The live nasal spray flu vaccine given to children has a very low egg protein content. It can be safely given to children with an egg allergy.

Children and adults who have previously had a very severe allergic reaction to eggs may be advised to have their flu vaccine in a hospital.

### **What is it?**

There are 2 vaccines in the UK routine schedule that contain small amounts of egg protein:

- the flu vaccine – which is grown on hens' eggs. It can potentially trigger an allergic reaction in people with an egg allergy
- the MMR vaccine – which is grown on cells from chick embryos, which is not the same as hens' eggs. This means it does not trigger an allergic reaction

## [Formaldehyde](#)

### Is it safe?

Formaldehyde can be found naturally in our bloodstream at levels far higher than we would be exposed to in vaccines.

Although formaldehyde can be harmful in high concentrations, there are no health concerns about the small amounts found in vaccines.

### What is it?

Formaldehyde is a chemical also used in the production of killed vaccines. It's used very early in the manufacturing process to kill or inactivate the toxins from bacteria or viruses.

Once the antigens are inactivated, the formaldehyde is diluted out. It's possible that trace amounts may remain in the final vaccine.

## [Antibiotics](#)

### Are they safe?

If you know you're allergic to neomycin or any other antibiotic, speak to your doctor or practice nurse before having a vaccine.

Antibiotics known to cause allergic reactions, such as penicillin, are generally not used in vaccines.

But tiny amounts of an antibiotic called neomycin, which is capable of triggering an allergic reaction, are found in:

- the MMR vaccine
- 6-in-1 vaccine
- quadrivalent inactivated flu vaccine
- 4-in-1 pre-school booster vaccine Repevax
- shingles vaccine

### What are they?

Antibiotics are added to some vaccines to prevent the growth of bacteria during the production and storage of the vaccine.

Antibiotics can only be found in tiny amounts in the final vaccine.

A full list of any vaccine's ingredients is available on the electronic medicines compendium (emc) website (Link: <https://www.medicines.org.uk/emc/browse-medicines/>)



Read more about specific vaccine ingredients on the Oxford University Vaccine Knowledge Project website (Link: <http://vk.ovg.ox.ac.uk/vaccine-ingredients>)

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