

Patient information from the BMJ Group

Ear infection

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Ear infection

If your child has an ear infection, they should get better in a few days. If your child's ear hurts, painkillers can help. Antibiotics may help some children, but they can have side effects.

The type of infection we talk about here affects the part of the ear called the middle ear. Children can also get fluid trapped in their middle ear after an ear infection. To learn more, see our articles on [Glue ear](#).

We've brought together the best research on ear infections and weighed up the evidence about how to treat them. You can use our information to talk to your doctor about what treatments are best for your child.

What is an ear infection?

Has your young child been crying more than usual and pulling on their ear? If so, your child could have an ear infection.



If your child is crying more than usual, they could have an ear infection.

Ear infections usually start when a child gets a cold, a sore throat, or another common [infection](#). The infection spreads to one or both ears, making them swollen, blocked, and painful.

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The type of infection we talk about here affects the part of the ear called the middle ear. Your doctor may call it an **acute ear infection**, **acute otitis media**, or **purulent otitis media**.

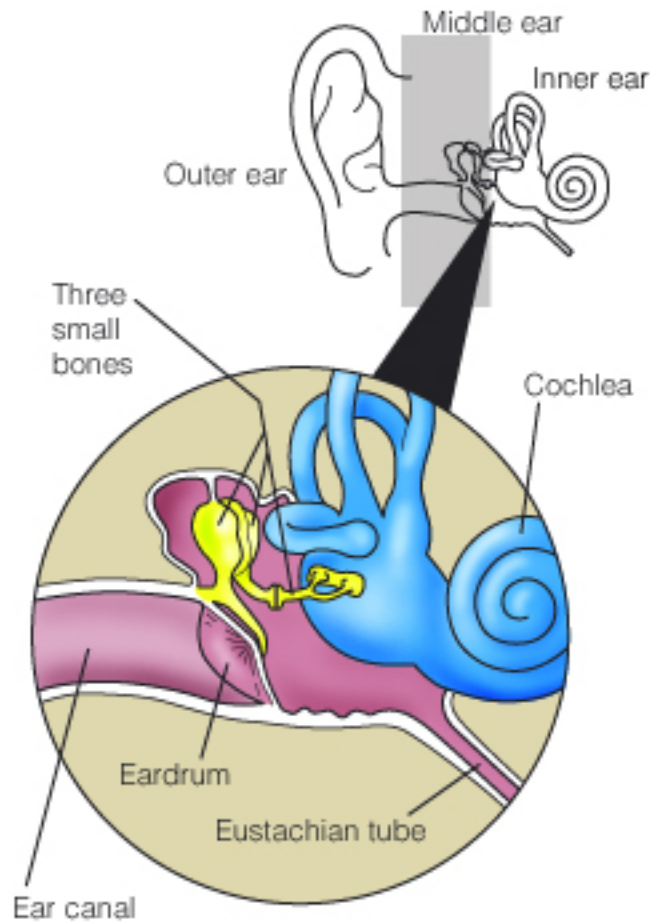
Key points for parents about ear infections

- Ear infections are very common, especially in children under 6 years. ^[1]
- Ear infections hurt and can stop your child hearing properly.
- Most children (4 in 5) feel better without any treatment after two or three days. ^[2]
- You can help your child's ear pain by giving them a painkiller such as paracetamol or ibuprofen.
- Some children need antibiotics. These can help clear up the infection, but they have side effects. ^[3]
- If your child has problems hearing after an ear infection clears up, they may have fluid trapped in their ear. For more on this condition, see our articles on [Glue ear](#) .

How ears work

To understand what happens when your child gets an ear infection it helps to know a little about the ears and how they work.

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Small bones inside your middle ear carry sound to your inner ear.

- Your **outer ear** is the part you can see. It 'catches' the sounds around you.
- The hole in the middle is your **ear canal**. It carries sounds into your ear.
- Stretched across the end of your ear canal is your **eardrum**. This thin tissue moves when sounds reach it.
- Behind your eardrum is your **middle ear**. It's usually filled with air. It also has three tiny bones that move when sounds reach them.
- The bones carry sounds to your **inner ear**. Here, special nerves pick up the sounds and send signals to your brain. (Your inner ear also helps you keep your balance.)
- Your brain translates these signals and recognises them as sounds.
- Your **eustachian tube** connects your middle ear to the back of your nose (just above the roof of your mouth). This tube is closed most of the time. But when you swallow or yawn, it opens briefly. This lets air flow into the tube, so that the air pressure inside your ear and outside your head is the same.

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- Your eustachian tube also lets any fluid in your middle ear drain off down your throat.

What happens with ear infections

Ear infections usually start with an illness such as a cold or sore throat. The germ causing the illness travels up your child's eustachian tube to their middle ear. So this part of the ear becomes infected and painful. (For more, see [Illnesses that can lead to ear infections](#) .)

Ear infections can be caused by two types of germs: **bacteria** and **viruses** .

Here's what happens.



An infected eardrum looks red and sore.

- The lining of your child's middle ear and eustachian tube becomes **inflamed** (red and swollen) because of the illness.
- A thick fluid (called mucus) starts to build up in your child's eustachian tube and middle ear.
- The fluid may stop your child's eardrum and the tiny bones in the middle ear moving properly, which stops them carrying sound. So, your child may have problems hearing.
- Bacteria or viruses get trapped in the fluid. ^[4]
- Your child's body makes chemicals that fight the bacteria or viruses. These chemicals cause more swelling.
- The swelling pushes against your child's eardrum, which gets red and painful.
- Your child's eardrum may burst. If it does, you may see fluid coming out of your child's ear. This helps reduce your child's pain. The tear in the eardrum will heal after a few days.

Most ear infections last only a few days. But in some children fluid stays trapped in the middle ear even after they seem better. This can lead to a condition called glue ear, which can last for many months. Fluid in the ear can stop your child hearing properly.

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This could make learning difficult. For more about this condition and how it's treated, see our articles on [Glue ear](#) .

Most colds and sore throats get better without causing ear infections. Usually your child's body fights off the germ that's causing the illness in a few days. And if fluid builds up in their middle ear it usually drains away without causing any problems. But some children seem to get ear infections every time they have a cold or similar illness.

Ear infection: why my child?

Anyone can get an ear infection. But children are more likely to get them than adults because their eustachian tubes are much shorter. Shorter tubes get blocked with mucus more easily, so the fluid can't drain from the middle ear. ^[5]



Children who go to nursery are more likely to get ear infections than children who don't.

Some children are more likely than others to get ear infections. Things that make it more likely that someone will get an illness are called risk factors.

These are the risk factors for ear infections in children.

- Going to nursery: The **bacteria** and **viruses** that cause ear infections spread from person to person. So children who spend lots of time with other children are more likely to catch these germs. ^[1] This is one of the biggest risk factors for ear infections.
- Having a family member who's had an ear infection: Children who have a parent, brother, or sister who's had an ear infection are more likely to get one. ^[6]
- Boys tend to get more ear infections than girls do. We don't know why. ^[7]
- Children who were bottle-fed as babies tend to get more ear infections than children who were breastfed. This may be because a mother's milk helps strengthen a baby's **immune system** (the body's system for fighting infection). Also, breastfed babies

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tend to be held in a nursing position that lets their eustachian tubes work well.^[8] These tubes drain fluid and germs from your baby's middle ear.

- Children with parents who smoke may be more likely to get ear infections.^[1]
- Having an ear infection very early in life: Children who get an ear infection before 18 months are likely to get more ear infections in the next few years.^[7]

For children who are particularly prone to ear infections, it's possible that using a dummy could mean they get them more often.^[9] However, it's worth remembering that young babies who sleep with a dummy have a smaller chance of cot death. If your child is over 1 year old, and is getting lots of ear infections, you could try weaning them off their dummy.

If your child gets lots of ear infections or gets very painful ear infections, there are some things you can do that may help prevent future infections. See [How to help your child avoid ear infections](#) .

What are the symptoms of an ear infection?

Here are some of the ways you might be able to tell if your child has an ear infection. Babies and younger children won't be able to tell you that their ear hurts, so the first sign might be that they rub or pull at their ear.

Children with an ear infection may:^[13]

- Rub or tug at their ear
- Say that their ear hurts
- Cry more than usual
- Be irritable.

They may also have:^[13]

- A high temperature
- A cold or cough
- Fluid or pus coming out of one or both ears
- Trouble sleeping
- Trouble keeping their balance

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- Trouble hearing (not responding to quiet sounds, for example).

It's possible for an ear infection to make a hole in a child's eardrum. You may hear this called a **perforated eardrum**. If this happens, you may see fluid coming out of your child's ear. The hole will usually heal by itself, although your doctor may want to check on your child after a few weeks to make sure it's healing properly.

How do doctors diagnose an ear infection?

Not all children with ear infections need to see a GP.

If your child can talk and tell you his or her ear is hurting, a painkiller may be all your child needs. And, it's the treatment that your GP may suggest if he or she thinks your child has an ear **infection**.

But if you're unsure what's wrong with your child, or painkillers don't seem to be working, then you should see your GP.

If your child can talk, the GP will ask your child where it hurts and how he or she feels. The GP may also ask you how long your child has had an earache and whether it has happened before. If your child can't describe his or her symptoms, or feels shy about talking in front of the doctor, then your GP will ask you about your child's symptoms and how long he or she has had them. Your GP will probably also look inside your child's ear.



Doctors look for redness and fluid behind the eardrum.

- They will use an instrument called an **otoscope** to look at your child's ear canal and eardrum. The otoscope lets your GP see any redness or fluid behind the eardrum.
- They may also gently push some air into your child's ear with this instrument to see if the eardrum moves.
- If your child's eardrum is red, full of pus or fluid, or doesn't move, your child probably has an ear infection.

To learn more about the different parts of your ear, see [What is an ear infection?](#)

After talking to you and your child, and looking inside your child's ear, your GP will probably be able to say whether your child has an ear infection.^[13] Your child won't usually need any further tests.

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However, if your child has problems hearing after the infection has cleared, they could have a condition called **glue ear** and may need some more tests. See our articles on [Glue ear](#) to learn more.

How common are ear infections?

Ear infection is the most common problem doctors see in young children.

- About 1 in 10 children have had an ear infection by the time they are 3 months old. ^[14]
- By the time they are 7 years old, most children have had at least one ear infection. ^[14]
- Ear infections are most common between the ages of 6 months and 15 months. ^[15]

What treatments work for an ear infection?

Ear infections are painful. But they usually clear up without treatment in a few days. Painkillers can help. Some children may need antibiotics, but these medicines can have side effects.

Key points about treating an ear infection

- Taking painkillers, such as ibuprofen and paracetamol, can help reduce the pain from ear infections.
- Taking antibiotics may help clear up your child's ear infection. But antibiotics have side effects.
- Your child may be less likely to get an ear infection if they take antibiotics regularly for a long time. But antibiotics can cause side effects. And taking them for a long time may mean they won't work for a more serious infection.

Which treatments work best for ear infections? We've looked at the best research and given a rating for each treatment according to how well it works. We've divided the treatments into two categories:

- [Relieving your child's ear infection](#)
- [Stopping your child getting more ear infections](#).

For help in deciding which treatment is best for your child, see [How to use research to support your treatment decisions](#).

Treatment Group 1

Treatments for relieving your child's ear infection

Treatments that are likely to work

- [Painkillers](#) : Paracetamol and ibuprofen are two commonly used painkillers. They work by reducing the pain caused by the ear infection. You can buy liquid paracetamol and liquid ibuprofen for young children over the counter at a pharmacy or a supermarket. [More...](#)

Treatments that work, but whose harms may outweigh benefits

- [Antibiotics](#) : These are drugs that work by killing the bacteria causing your child's ear infection. Examples of antibiotics used to treat ear infections (and their brand names) include amoxicillin (Amoxil), co-amoxiclav (Augmentin), cefaclor (Distaclor), cefixime (Suprax), clarithromycin (Klaricid), and erythromycin (Erythroped). You need a prescription for these medicines. [More...](#)

Treatments that are likely to be ineffective or harmful

- [Myringotomy](#) : Your child's surgeon makes a small cut in their eardrum. This lets any fluid that has built up in your child's middle ear drain out. Doctors call this operation a **myringotomy**. [More...](#)

Treatment Group 2

Treatments for stopping your child getting more ear infections

Treatments that are likely to work

- [Pneumococcal vaccination](#) : This vaccine helps prevent infections caused by pneumococcal bacteria. These bacteria can cause ear infections in children and also more serious diseases. [More...](#)

Treatments that work, but whose harms may outweigh benefits

- [Taking antibiotics for a long time](#) : This is when your child takes antibiotics for at least a few months to prevent ear infections coming back. [More...](#)

Treatments that are unlikely to work

- [Flu vaccine](#) : This vaccine helps prevent infections caused by the flu virus. [More...](#)
- [Xylitol syrup or chewing gum](#) : Xylitol is a sugar substitute, made from plant fibres. [More...](#)

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Treatments that are likely to be ineffective or harmful

- [Grommet surgery](#) : Putting a grommet in the ear allows the fluid in the middle ear to drain out. The theory is that the grommet prevents ear infections by allowing air into the middle ear through the eardrum. [More...](#)

What will happen to my child?

Most children get better in a few days.

About 4 in 5 children who have an ear infection get better without any treatment after about two or three days, and they have no lasting problems. ^[2]

Some children get ear infections again and again, especially those who get their first ear infection when they're younger than 18 months. ^[7] We're not sure why this happens. Here are two theories.

- These children may have a problem with the tubes leading from their middle ear to the back of their nose (the eustachian tubes).
- Or they may have a problem with their immune system (the body's system for fighting infection). ^[7]

Children who have ear infections over and over again may have problems with their speech and language. They're also more likely to have trouble eating and sleeping. And they seem to have more trouble paying attention than children who don't get ear infections that often. Sometimes this leads to problems in school. But it doesn't affect children's growth or development in the long term. ^[7]

As your child gets older, they are less likely to get ear infections. This is because your child's eustachian tubes get bigger and start to grow at an angle. This makes it harder for the tubes to clog with fluid and get infected.

Also, as children get older, they naturally develop some resistance to germs that can cause ear infections.

Problems that can follow ear infections

Usually ear infections aren't serious, but they can cause other problems if they don't clear up properly. These problems are more likely to happen if your child gets lots of ear infections.

Fluid in the ear

After an ear infection, fluid can get trapped inside your child's ear. ^[7] Doctors call this **glue ear** or **otitis media with effusion**. This fluid isn't infected with bacteria or viruses (unlike the fluid of an ear infection). So, if your child has glue ear, they won't have clear symptoms, such as pain or fever.

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But glue ear can stop your child hearing properly, which can make learning difficult. To learn more, see our articles on [Glue ear](#) .

Spread of the infection

An ear infection can spread to the large bone behind your child's ear (the **mastoid bone**). Doctors call this **mastoiditis** . It can cause severe pain, swelling, and tenderness behind your child's ear. But often there aren't any symptoms at all.

Mastoiditis is very rare. But if your child's ear infection doesn't seem to get better, they could have this condition. So, you should see your GP straight away.

Growth of extra skin in the ear

Rarely, skin cells from the eardrum can start to grow into your child's middle ear. This is most likely to happen if your child has had many ear infections. This condition is called a **cholesteatoma** .

If a cholesteatoma isn't treated, the new skin can damage the tiny bones in the middle ear that carry sound waves. That can cause hearing problems. The skin is usually taken out by surgery through the child's eardrum.

Questions to ask your doctor

If your child has been diagnosed with an ear infection, you may want to talk to your doctor to find out more.

Here are some questions that you might want to ask.

- How do you know that my child has an ear **infection** ?
- Why does my child have an ear infection?
- What tests has my child had, and what do the results mean? Does my child need any other tests?
- What are the best treatments for my child?
- Are **antibiotics** necessary? Will my child get better without them?
- What can I do if my child's ear hurts or if my child has a **high temperature** ?
- Can I do anything to stop my child getting more ear infections? What if my child gets ear infections all the time?

Treatments:

Painkillers

Ear infection

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[How good is the research on painkillers?](#)

This information is for people who have a child with an ear infection. It tells you about painkillers, a treatment used for ear infections. It is based on the best and most up-to-date research.

Do they work?

Yes. Painkillers, such as **paracetamol** and **ibuprofen**, can't cure your child's ear infection, but they will probably make your child feel better by reducing their ear pain. Ear drops containing anaesthetic can also help.

What are they?

There are many different kinds of painkillers. Two of the most common ones that doctors recommend for children are paracetamol and ibuprofen.

Paracetamol is available for children as a liquid (brand name Calpol), regular tablets, soluble tablets (tablets you dissolve in a liquid), and suppositories (tablets that you put in the rectum). You can buy paracetamol over the counter at a pharmacy or a supermarket.

Ibuprofen belongs to a group of drugs called **nonsteroidal anti-inflammatory drugs** (NSAIDs for short). In low doses, NSAIDs are painkillers. In higher doses, they also reduce **inflammation** (swelling and redness).

There are many ibuprofen products that you can buy over the counter at a pharmacy or a supermarket. For stronger doses, you'll need a prescription from your GP.

Some over-the-counter medicines are only suitable for children over certain ages. Ask your pharmacist for advice, or check the packaging.

If your child is in a lot of pain, some doctors may prescribe anaesthetic ear drops. These act quickly to kill the pain, while the painkiller tablets are starting to take effect.

How can they help?

One study looked at whether taking painkillers helped children with ear infections.^[16] All of the children in the study were also taking [antibiotics](#).

- About 90 in 100 parents of children who took paracetamol or ibuprofen for two days noticed that their child's pain had reduced.
- About 75 in 100 parents of children who took a dummy treatment (a **placebo**) for two days noticed that their child's pain had reduced.

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Children who took anaesthetic ear drops as well as painkillers were more likely to have had a big improvement in their pain within 30 minutes, compared to children who took painkillers but had dummy (placebo) ear drops. The ear drops seemed to start working within 10 minutes. ^[17]

How do they work?

When your child's ear is infected with bacteria or with a virus, their body makes chemicals to fight off the infection. This causes inflammation. If your child's ear is inflamed, parts of it might be painful, red, hot, or swollen. ^[18]

Ibuprofen stops your child's body making the chemicals that cause pain and inflammation. ^[18]

Paracetamol works by stopping the chemicals from sending such strong pain messages, so your child's ear doesn't hurt as much. But paracetamol won't reduce the swelling and redness in your child's ear.

Anaesthetic ear drops work quickly to numb the affected area. They may only work for a short time, so they're used as well as ibuprofen or paracetamol, instead of alone. ^[17]

Can they be harmful?

Some children feel sick, vomit, or have stomach pain after taking these painkillers. In the study we looked at: ^[16]

- About 7 in 100 children who took ibuprofen had this kind of side effect
- About 4 in 100 children who took paracetamol had this kind of side effect.

Usually these problems are mild and won't stop your child taking the medicine.

You might be able to stop your child getting these problems by giving them the medicine soon after meals or with food or milk.

If your child is taking paracetamol, don't give them another medicine that has paracetamol in it, such as some cough syrups. This is because it's dangerous for children to get too much paracetamol. ^[19]

Read the labels of other medicines very carefully, or ask a pharmacist if you're not sure. Getting too much paracetamol can damage your child's liver and kidneys, and lead to liver failure or kidney failure. Make sure your child takes the recommended dose for their age.

Some children who had anaesthetic ear drops felt dizzy, but recovered without further treatment. ^[17]

How good is the research on painkillers?

We found one good-quality study (a [randomised controlled trial](#)) on painkillers for reducing ear pain in children. ^[16] The study included 219 children aged from 1 to 6 who had ear infections.

One problem with this study is that the researchers asked the parents how much ear pain their children had instead of asking the children. But this was because some of the children were too young to say how they felt.

We found some good evidence that anaesthetic ear drops help reduce pain quickly. We found one summary of the evidence, that looked at two studies including 117 children in total. ^[17]

Antibiotics

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[How good is the research on antibiotics?](#)

This information is for people who have a child with an ear infection. It tells you about antibiotics, a treatment used for ear infections. It is based on the best and most up-to-date research.

Do they work?

Antibiotics may help your child recover from an ear [infection](#) faster. But most children get better anyway without antibiotics. Also, these medicines don't clear up all ear infections. And they can cause side effects.

What are they?

Antibiotics are drugs that kill [bacteria](#) . They are divided into different types, depending on how they work in your body. Examples of antibiotics used to treat ear infections (and their brand names) include:

- Amoxicillin (Amoxil)
- Cefaclor (Distaclor)
- Cefixime (Suprax)
- Clarithromycin (Klaricid)
- Co-amoxiclav (Augmentin)

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- Erythromycin (Erythroped).

All these drugs come in doses suitable for children. They're usually prescribed as a liquid that your child can swallow. The antibiotic usually recommended for ear infections is called **amoxicillin**. It belongs to a group of antibiotics called **penicillins**.

Guidelines for doctors say they should not prescribe antibiotics for ear infections unless they think a child really needs them.^[20] This is because antibiotics may not work as well in the future if they are used too much. This is called **antibiotic resistance**. Your doctor may decide to prescribe antibiotics if:^[20]

- Your child has an infection in both ears and is aged under 2
- Your child has discharge coming from the infected ear
- Your child seems very unwell or is at risk of getting serious complications.

If your GP prescribes antibiotics your child will usually need to take them for between five and 10 days.

How can they help?

Antibiotics can help children with ear infections get better faster.^[21] They can also reduce how many painkillers your child needs to take. But many children get better without antibiotics.

In one large summary of the research, children who took antibiotics were less likely to have pain four to seven days after seeing a doctor:^[21]

- Of the children taking antibiotics, 19 in 100 still had pain
- Of the children taking pretend (placebo) tablets, 25 in 100 still had pain.

Here's what the research tells us about taking antibiotics.

- Most antibiotics work about as well as each other. But a type called macrolides may work less well than others. (Macrolide antibiotics include erythromycin, clarithromycin, and azithromycin.)^[22]
- Sometimes doctors suggest waiting before starting antibiotics, to see if the infection goes away on its own. If that happens your child won't need antibiotics and will avoid side effects. Research shows that if you give your child antibiotics straight away rather than waiting a few days, your child is a little more likely to feel better, sooner. But there isn't much difference to other symptoms like pain.^{[21] [23]}

How do they work?

A cold or flu can cause fluid to build up in your child's middle ear. This fluid is a perfect home for **bacteria** to live, grow, and make more bacteria. ^[4] Having more bacteria can cause more **inflammation** (redness and swelling) and pain for your child.

Antibiotics kill bacteria. They also stop new bacteria from living in your child's middle ear. But antibiotics don't kill viruses.

Can they be harmful?

Antibiotics can have side effects. Your child may get an upset stomach, diarrhoea, or a rash. ^[21]

The side effects your child gets may depend on the antibiotic they take. And some antibiotics are more likely than others to give a child side effects. ^[24]

- Children who take cefixime seem to have more side effects than children who take amoxicillin or ampicillin.
- Children who take co-amoxiclav seem to have more side effects than children who take azithromycin.

When antibiotics are used too much, bacteria can become resistant to them. That means that the antibiotics no longer kill the bacteria. More and more bacteria are becoming resistant to antibiotics, which means the antibiotics may no longer be helpful for really serious infections. ^[25] This is one reason why children shouldn't take antibiotics unless they really need them.

How good is the research on antibiotics?

There has been lots of research on whether antibiotics can help children with ear infections. Many of the best studies have been summarised in a large review of the research (called a **systematic review**). ^[21] This included studies that compared antibiotics with a dummy treatment (a **placebo**).

Large studies have also looked at whether some antibiotics work better than others for ear infections. ^[22]

Myringotomy

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[How good is the research on surgery to make a hole in the eardrum?](#)

Ear infection

This information is for people who have a child with an ear infection. It tells you about surgery to make a hole in the eardrum, a treatment used for ear infections. It is based on the best and most up-to-date research.

Does it work?

No. Surgery to make a hole in the eardrum is unlikely to clear up your child's ear infection .

What is it?

During this operation a surgeon makes a small hole in the eardrum. This lets any fluid that has built up in the middle ear drain out. Doctors call this a **myringotomy**.

Doctors don't usually do this surgery for an ear infection . They might consider it if [antibiotics](#) haven't worked and a child is in bad pain, or if the infection has spread. ^[26]

To learn more about this operation, see [More about surgery to make a hole in the eardrum](#)

How can it help?

There is no evidence that this operation can help .

One study found that this operation didn't help reduce the pain of ear infections in the days after the surgery. ^[27]

A second study found that the ear infections of children who had surgery were likely to last longer than those of children who took antibiotics. ^[28]

A third study found that children were more likely to get better within 12 hours if they had antibiotics than if they had this operation. ^[29]

How does it work?

Surgery to make a hole in the eardrum allows any infected fluid in the middle ear to drain away. The theory is that this should help relieve pain and clear up the infection. ^[26]

If your child's ear infection has spread, this surgery allows doctors to examine the fluid in the middle ear so they can tackle the infection with other treatments. ^[26]

Can it be harmful?

Like any surgery, cutting the eardrum has a risk of other problems (doctors call these problems complications). Possible complications include bleeding and infection .

How good is the research on surgery to make a hole in the eardrum?

There is evidence to show that this operation doesn't help with ear infections. We found three good-quality studies (randomised controlled trials). ^[29] ^[30] ^[31]

Flu vaccine

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[How good is the research on flu vaccines?](#)

This information is for people who have a child with an ear infection. It tells you about flu vaccination. It is based on the best and most up-to-date research.

Does it work?

Flu vaccine works to help children avoid getting the flu. But it doesn't seem to cut their chances of getting an ear infection.

What is it?

Flu viruses mutate (change) from year to year. Every year, scientists try to work out which strains of flu are most likely to be around the following winter. Then they make a vaccine to fight those types of flu.

There are two types of flu vaccine. One type you take by injection. It's made from dead flu viruses that can't hurt you. ^[32] One or two weeks after you have this jab, your body builds up immunity against flu. This lasts about one year. ^[33]

The other type of flu vaccine is a nasal spray. This spray contains flu virus that is alive but very weak. It helps you build up immunity without getting ill. This kind of vaccine isn't available in the UK.

Usually you take a flu vaccine in the autumn. That way, you are protected when flu comes around in winter. The flu virus changes from year to year, and the vaccine wears off. So if you need a flu vaccine, you'll need a new one every year. ^[32] The flu vaccine is made in eggs. If your child is allergic to eggs, talk to your doctor before they have the vaccine.

How can it help?

Flu vaccine reduces children's chances of getting flu by about 60 percent. ^[34] One study looked at children who were between 2 and 16. About 8 in 100 children who had the vaccine got flu. This compared with about 26 in 100 children who didn't have the vaccine.

But flu vaccine seems no more effective than a dummy (placebo) injection at preventing children from getting an ear infection. ^[35]

How does it work?

Flu vaccine doesn't work to prevent ear infection in children.

Can it be harmful?

The studies we looked at didn't say whether children had side effects from the flu injection. But we know the injection may cause a sore arm.^[35] Some people have muscle aches or a mild fever after their jab.^[33]

How good is the research on flu vaccines?

There is good-quality evidence to say that flu jabs don't prevent ear infections in children. We found one summary of the evidence (a [systematic review](#)) that included six good-quality studies, looking at more than 5,000 children.^[35]

Xylitol syrup or gum

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[How good is the research on xylitol?](#)

This information is for people who have a child with an ear infection. It tells you about xylitol syrup and chewing gum. It is based on the best and most up-to-date research.

Does it work?

Probably not. It might work at high doses, taken five times a day or more. But this is not very practical in the long term.

What is it?

Xylitol is a naturally-occurring sugar substitute, with fewer calories than sugar. It doesn't seem to cause tooth decay in the way that sugar does, so it's often used as a sweetener for chewing gum and also in children's medicines.

Xylitol is available in chewing gums, and also as a syrup.

How can it help?

Research shows that giving young children xylitol five times a day, as chewing gum or syrup, may mean they have fewer ear infections.^[36]

But giving children xylitol three times a day doesn't seem to work, and neither does giving xylitol just while the child has an ear infection.^[36] Doctors think that it's unrealistic to

Ear infection

expect young children to take xylitol five times a day, every day. So they say xylitol is unlikely to work.

How does it work?

Chewing gum regularly might help keep the ear tubes open, by encouraging children to swallow often. Also, xylitol is thought to have some antibacterial properties.

Can it be harmful?

The studies we looked at didn't say whether xylitol caused any problems for the children taking it. But we do know that high doses of xylitol can cause stomach upsets and diarrhoea. ^[36]

How good is the research on xylitol?

There's a fair amount of evidence to show the effect of xylitol on ear infections in children. We found one review of studies (called a [systematic review](#)) that looked at four smaller studies. The various studies looked at xylitol in syrup form or as chewing gum, and at whether it was given during an infection, or just given regularly to try to prevent infections. ^[36]

Taking antibiotics for a long time

In this section

[Does it work?](#)

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[How does it work?](#)

[Can it be harmful?](#)

[How good is the research on taking antibiotics for a long time?](#)

This information is for people whose child gets frequent ear infections. It tells you about taking antibiotics for a long time, a treatment used to prevent ear infections. It is based on the best and most up-to-date research.

Does it work?

Perhaps. Taking antibiotics for several months without a break may help stop your child's colds from turning into ear [infections](#) . But antibiotics can cause side effects. And taking them for a long time may mean they won't work so well in the future.

What is it?

Taking antibiotics for a long time means taking them for three months to two years without a break, even if your child doesn't have an ear infection. Antibiotics are drugs that kill germs called [bacteria](#) , which can cause infections.

There are many types of antibiotics, and each type works in a slightly different way. For more, see [Antibiotics](#) .

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Here's a table of the antibiotics that GPs often prescribe for ear infections. All the drugs listed in the table come in doses that are suitable for children. They usually come as a liquid that your child can swallow.

Type	Drug name	Brand name
Penicillins	Amoxicillin	Amoxil
	Ampicillin	Rimacillin
	Co-amoxiclav	Augmentin
Cephalosporins	Cefaclor	Distaclor
	Cefixime	Suprax
	Cefpodoxime	Orelox
Macrolides	Azithromycin	Zithromax
	Clarithromycin	Klaricid
	Erythromycin	Erythroped

Most doctors are careful not to prescribe antibiotics unless they think a child really needs them. This is because if antibiotics are used too much, they may not work as well in the future. This is called **antibiotic resistance**.

But if your child gets several ear infections in a year, your doctor may prescribe antibiotics for a few months.

Some children are allergic to penicillins, which are a common type of antibiotic. An allergy happens when the body's immune system over-reacts to a substance that's usually harmless. If your child has had an allergic reaction (such as a rash) to a penicillin before, your doctor will prescribe a different type of antibiotic.

How can it help?

If your child keeps getting ear infections, then taking antibiotics might reduce their chances of getting more infections. ^[37]

One summary of 13 studies found that: ^[37]

- About 3 in 10 children who took antibiotics for at least six weeks got an ear infection
- About 5 in 10 children who didn't take antibiotics got an ear infection.

How does it work?

A cold or flu can cause fluid to build up in your child's middle ear. This fluid is an ideal place for new bacteria to live, grow, and make more bacteria. ^[4] More bacteria can cause more inflammation (redness and swelling) and pain for your child.

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Antibiotics kill bacteria. They also stop new bacteria from being able to live in your child's middle ear by changing the fluid. If your child keeps taking the antibiotic, bacteria won't be able to live in their ear. Any bacteria that get in will be killed.

If your child still gets an **infection** despite taking an antibiotic, it might mean that the bacteria are resistant to that particular antibiotic.

Can it be harmful?

The summary of the research mentioned above found that children who took antibiotics for a long time were no more likely to get side effects than children who took a dummy treatment (a **placebo**).^[37] But we know that antibiotics can sometimes cause an upset stomach, **diarrhoea**, or a rash. These side effects are usually mild.

The side effects your child gets depend on the antibiotic they take.^[24]

- Children who take cefixime seem to have more side effects than children who take amoxicillin or ampicillin.
- Children who take co-amoxiclav seem to have more side effects than children who take azithromycin (Zithromax).

How good is the research on taking antibiotics for a long time?

There is good evidence that taking antibiotics for a long time can stop children getting ear infections.^[37] We found one summary of the research, which looked at the results from 16 good-quality studies (**randomised controlled trials**).^[37] The studies included nearly 1,500 children who got a lot of ear infections or were at increased risk of getting ear infections.

But using antibiotics too much can lead to drug resistance, when these drugs no longer work against certain **bacteria**. For this reason doctors try to use antibiotics only when they really need to.

Pneumococcal vaccination

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[How good is the research on pneumococcal vaccination?](#)

This information is for people whose child gets frequent ear infections. It tells you about pneumococcal vaccination. It is based on the best and most up-to-date research.

Ear infection

Does it work?

It may work if given to babies younger than 1 year of age. But giving the vaccine to older children, or to children who have already had a number of ear infections, doesn't seem to work.

What is it?

The pneumococcal vaccine helps prevent **infections** caused by pneumococcal bacteria. These **bacteria** can cause ear infections in children, as well as more serious diseases, such as **pneumonia** , **meningitis** , and bacteraemia (an infection of the blood).

Your child will be offered vaccination against pneumococcal bacteria at the same time as other routine childhood immunisations. ^[38] The vaccine is given by injection usually at 2, 4, and 13 months of age.

Two types of vaccine are used to protect against pneumococcal infection. Both of these vaccines protect against several types of pneumococcal bacteria. The type of vaccine your child is given and the number of doses they get depends on their age.

- Young children are given the **pneumococcal conjugate vaccine** (or PCV for short). This protects against various types of pneumococcal bacteria that can affect young children. ^[38]
- Some children are more at risk of getting a pneumococcal infection. They may have heart or lung problems, have a weak **immune system** , or have had a pneumococcal disease before. These children may also be offered the **pneumococcal 23-valent polysaccharide vaccine** (or PPV for short), usually at 2 years of age or older. ^[38]

How can it help?

Pneumococcal vaccination doesn't appear to help much with ear **infections** when given to children older than one year. ^[39]

However, children who had the pneumococcal vaccine as babies seem to have fewer ear infections, although the difference is not big. The reduction is less than 10 percent. ^[39]

However, even a small reduction in the percentage of children getting ear infections can benefit a lot of children, if all children in the country have the vaccination.

How does it work?

Pneumococcal bacteria are a common cause of ear **infections** in children. Pneumococcal vaccines aim to immunise children against pneumococcal infection. The vaccines help your child's body make **antibodies** ahead of time. These antibodies protect your child from illness should he or she get infected with pneumococcal bacteria.

Can it be harmful?

The pneumococcal vaccine doesn't usually cause any problems. Your child's arm may be slightly sore and have a lump where it is injected, but this should soon go away. Or your child may get a mild fever for a day or so. ^[38]

Rarely, some people react badly to the vaccine. You should get urgent medical help if your child gets breathless, or develops swelling or a rash within a few days of immunisation.

How good is the research on pneumococcal vaccination?

We found one big summary of the research (a **systematic review**) looking at seven studies. ^[39] The studies covered many thousands of children. However, there were big differences between the studies, including differences in which type of vaccine was used. That makes it difficult to get a good idea overall of how well pneumococcal vaccination works.

Grommet surgery

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[How good is the research on surgery to put in grommets?](#)

This information is for people whose child gets frequent ear infections. It tells you about surgery to put in grommets, a treatment used to prevent ear infections. It is based on the best and most up-to-date research.

Does it work?

Surgery to put in grommets may reduce the number of ear **infections** your child gets, but only in the first six months or so. Plus there's a chance that surgery could damage the eardrum.

What is it?

During this operation, the surgeon first makes a small hole in your child's eardrum and drains away the fluid. Then they put a small tube called a grommet in the hole in one or both of your child's ears. The tube lets air reach the middle ear. Doctors call this a **tympanostomy**.

Doctors usually do this operation for a condition called glue ear, rather than for an ear **infection** . Glue ear is when fluid gets trapped inside a child's ear, often after an ear infection has cleared up. It can affect a child's hearing. For more information, see [Glue ear](#) . But your doctor might also suggest this operation if your child is having a lot of ear infections.

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It's normal for grommets to fall out after six months to 12 months.

To learn more about this operation, see [More about surgery to put in grommets](#) .

How can it help?

One small study looked at 44 children who had grommets put in one of their ears. For six months afterwards, the children had fewer **infections** in the ear that was operated on. ^[40] But this benefit didn't last.

A **review** of the research found two small studies looking at grommets. The first found that children had one or two fewer ear infections in the six months after surgery. The second also found that children got slightly fewer ear infections after having grommet surgery, but the difference was small enough to have happened by chance. ^[41]

How does it work?

The theory is that putting grommets in the ear allows any fluid that collects in the middle ear, which might become infected, to drain away. This allows air into the middle ear through the eardrum. Draining away any fluid and allowing air into the middle ear may help prevent further **infections** .

Can it be harmful?

Like any surgery, putting grommets in the ear has a risk of other problems (doctors call these problems complications).

It's common for a child to have a small discharge from their ear after this operation. But this doesn't necessarily mean that the ear is infected.

One small study found that some scarring of the eardrum is more common in children who had grommets. ^[40] But we're not sure whether scarring would affect a child's hearing in any way. The study also found that children who had grommets were slightly more likely to get other problems with their eardrums such as thinning of the eardrum. They might also have a hole that doesn't heal properly.

How good is the research on surgery to put in grommets?

We haven't found much research to tell if surgery to put in grommets helps to prevent further ear **infections** .

One good-quality study (a **randomised controlled trial**) was small, including just 44 children. ^[40]

A **review** of the research found two small studies looking at grommets. ^[41] Between them the two studies only included 145 children. Larger studies would give us a clearer picture. But, as this treatment doesn't seem to work all that well, the studies may not happen.

Further informations:

Illnesses that can lead to ear infections

Any germ that causes an illness in your mouth, throat, or nose can travel to your ear and cause an infection there.

The most common types of germs are **bacteria** and **viruses** . These are tiny organisms that can get into your body, grow there, and make you ill.

Here are some of the illnesses that can start in your mouth or throat and spread to your ear.

Colds

Colds are caused by viruses. There are more than 200 different cold viruses. Each virus can give you a cold only once. After that your body becomes resistant to it. This means your body will kill the virus before it can make you ill.

Many children seem to get colds all the time because their body hasn't come across many viruses. So each time a cold's going around they seem to get it. As you get older you tend not to get so many colds. That's because you've had many of them before and you become resistant to those viruses.

Sore throats

If you have a cold or flu, soreness in the back of your throat is usually one of the first symptoms. Sore throats can also be caused by bacteria. One type of bacteria that causes a sore throat is called **Streptococcus** .

Flu

Flu (short for influenza) is caused by a virus.

Tonsillitis

If your tonsils get infected with viruses or bacteria you can get tonsillitis (**inflammation** of your tonsils). Your throat gets very sore and you may have trouble swallowing. You may also have a **high temperature** , a headache, and body aches. Children tend to get tonsillitis more than adults do.

Croup

Croup causes a cough in young children that sounds like barking. This illness is often caused by the same viruses and bacteria that cause colds and sore throats.

Young children get croup because their throats are narrower than adults' throats. This means their throats get blocked more easily when there's swelling in this area, and they make a barking sound when they cough.

How to help your child avoid ear infections

It's almost impossible to stop your child getting colds and other illnesses that can lead to ear infections. But there are some things that might help your child avoid them.

There hasn't been much research to show for certain that these things help, but they might be worth trying.

- Don't smoke near your child, and make sure no one else does either. Exposing your child's ears to cigarette smoke may put them at higher risk of ear infections.^[10]
- Try to keep your child away from other children who have colds or other infections whenever possible.
- If you're pregnant or you've just had a baby, consider breastfeeding your newborn, even for just a few weeks. Breastfeeding rather than bottle-feeding seems to protect children from ear infections in the years to come.^[11]
- If you choose to bottle feed, try not to let your child use a bottle lying down. Babies who drink from a bottle lying down seem to get ear infections more often.
- If your child has an allergy, remove the thing that triggers their allergic reaction, such as animal hair. Some research has shown that allergies are linked to ear infections.^[12] (An allergy happens when the body's immune system over-reacts to a substance that's usually harmless, such as pollen.)
- If your child gets an ear infection, ask your GP if antibiotics are necessary (antibiotics are drugs that kill bacteria). Using antibiotics too much can cause bacteria to become resistant to them. This means there's a chance that the next time your child uses antibiotics they might not work.

It's not clear from the research whether sucking a dummy can cause ear infections. There might be a risk for children who are prone to ear infections. If your child gets lots of ear infections, and they are over 1 year old, it might be worth trying to wean them off their dummy.^[9]

More about surgery to make a hole in the eardrum

The operation to make a hole in the eardrum takes about 20 minutes. Usually children are given a general anaesthetic so that they are asleep during surgery. But older children

Ear infection

can stay awake and have a local anaesthetic that numbs the inside of the ear. Either way, your child won't feel any pain.

The operation will probably be done by a doctor who specialises in surgery on the ears, nose and throat (an ENT surgeon).

- During the operation, the surgeon tilts your child's head to one side on the operating table.
- They open your child's ear canal using a special instrument called a **speculum** and they look into the ear with a microscope.
- Then they makes a tiny cut (2 or 3 millimetres long) in the lower part of your child's eardrum, using a small knife. The fluid that has built up in the middle ear drains out, helped by a suction tube.

Your child won't need any stitches or dressings. They probably won't need to spend a night in hospital.

More about surgery to put in grommets

The operation to fit grommets takes about 20 minutes. Usually, children are given a general anaesthetic so they are asleep during surgery. But older children can stay awake and have a local anaesthetic that numbs the inside of the ear. Either way, your child won't feel any pain.

The operation will probably be done by a doctor who specialises in surgery on the ears, nose, and throat (an ENT surgeon).

- During the operation, the surgeon tilts your child's head to one side on the operating table.
- They open your child's ear canal using a special instrument called a **speculum**, and look into the ear with a microscope.
- The surgeon then makes a tiny cut (2 or 3 millimetres long) in the lower part of your child's eardrum, using a very small knife.
- The fluid that has built up in the middle ear drains out, helped by a suction tube.
- Once all the fluid has been sucked away, the surgeon puts a grommet in through the hole. One end stays on each side of the eardrum.
- This keeps the hole open, allowing air to get into your child's middle ear.

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Grommets are a few millimetres long and made of plastic. There are different types designed to stay in your child's eardrum for different lengths of time. Many doctors use grommets that fall out after six months.

Your child won't need any stitches or dressings and probably won't have to spend a night in hospital.

Glossary:

infection

You get an infection when bacteria, a fungus, or a virus get into a part of your body where it shouldn't be. For example, an infection in your nose and airways causes the common cold. An infection in your skin can cause rashes such as athlete's foot. The organisms that cause infections are so tiny that you can't see them without a microscope.

bacteria

Bacteria are tiny organisms. There are lots of different types. Some are harmful and can cause disease. But some bacteria live in your body without causing any harm.

viruses

Viruses are microbes (tiny organisms) that need the cells of humans or other animals to exist. They use the machinery of cells to reproduce. Then they spread to other cells in the body.

inflammation

Inflammation is when your skin or some other part of your body becomes red, swollen, hot, and sore. Inflammation happens because your body is trying to protect you from germs, from something that's in your body and could harm you (like a splinter) or from things that cause allergies (these things are called allergens). Inflammation is one of the ways in which your body heals an infection or an injury.

streptococcus

Streptococcus is a type of bacteria that most often causes problems in your mouth or lungs.

high temperature

A high temperature is a general sign that there is an infection or inflammation in your body. Temperatures vary, but anything over about 38 degrees Celsius (100 degrees Fahrenheit) is considered high.

immune system

Your immune system is made up of the parts of your body that fight infection. When bacteria or viruses get into your body, it's your immune system that kills them. Antibodies and white blood cells are part of your immune system. They travel in your blood and attack bacteria, viruses and other things that could damage your body.

allergy

If you have an allergy to something (such as pollen or a medicine), your body always overreacts to it. The reaction happens because your immune system (your body's system for fighting infection) is too sensitive to it.

fever

If you have a fever, your body temperature is above 37 degrees Celsius (98.6 degrees Fahrenheit). With a fever you often get other symptoms, such as shivering, headache or sweating. A fever is usually caused by an infection.

mastoiditis

Your mastoid process is the bony area that sticks out slightly behind your ear. Mastoiditis occurs when this area becomes inflamed. You can get mastoiditis when the inside of your ear is infected.

cholesteatoma

A cholesteatoma is a lump of skin that can grow in your middle ear, behind your eardrum. It may happen if you have lots of ear infections. If a cholesteatoma grows over a long time, it can cause hearing problems or dizziness.

otoscope

An otoscope is a tool your doctor uses to look into your ear.

antibiotics

These medicines are used to help your immune system fight infection. There are a number of different types of antibiotics that work in different ways to get rid of bacteria, parasites, and other infectious agents. Antibiotics do not work against viruses.

general anaesthetic

Ear infection

You may have a type of medicine called a general anaesthetic when you have surgery. It is given to make you unconscious so you don't feel pain when you have surgery.

local anaesthetic

A local anaesthetic is a painkiller that's used to numb one part of your body. You usually get local anaesthetics as injections.

NSAIDs

NSAID stands for nonsteroidal anti-inflammatory drug. NSAIDs help with pain, inflammation and fever. They are called 'nonsteroidal' because they don't contain any steroids. Aspirin and ibuprofen are both NSAIDs.

placebo

A placebo is a 'pretend' or dummy treatment that contains no active substances. A placebo is often given to half the people taking part in medical research trials, for comparison with the 'real' treatment. It is made to look and taste identical to the drug treatment being tested, so that people in the studies do not know if they are getting the placebo or the 'real' treatment. Researchers often talk about the 'placebo effect'. This is where patients feel better after having a placebo treatment because they expect to feel better.

Tests may indicate that they actually are better. In the same way, people can also get side effects after having a placebo treatment. Drug treatments can also have a 'placebo effect'. This is why, to get a true picture of how well a drug works, it is important to compare it against a placebo treatment.

liver

Your liver is on the right side of your body, just below your ribcage. Your liver does several things in your body, including processing and storing nutrients from food, and breaking down chemicals, such as alcohol.

kidney

Your kidneys are organs that filter your blood to make urine. You have two kidneys, on either side of your body. They are underneath your ribcage, near your back.

kidney failure

Kidney failure is when your kidneys can't make urine properly. Kidney failure happens because of kidney disease. People with kidney failure need to have dialysis, which is a way to get rid of the substances in your blood that normally go in your urine.

randomised controlled trials

Randomised controlled trials are medical studies designed to test whether a treatment works. Patients are split into groups. One group is given the treatment being tested (for example, an antidepressant drug) while another group (called the comparison or control group) is given an alternative treatment. This could be a different type of drug or a dummy treatment (a placebo). Researchers then compare the effects of the different treatments.

systematic reviews

A systematic review is a thorough look through published research on a particular topic. Only studies that have been carried out to a high standard are included. A systematic review may or may not include a meta-analysis, which is when the results from individual studies are put together.

diarrhoea

Diarrhoea is when you have loose, watery stools and you need to go to the toilet far more often than usual. Doctors say you have diarrhoea if you need to go to the toilet more than three times a day.

pneumonia

Pneumonia is an infection in your lungs. Anything that causes infections (bacteria, viruses or fungi, for example) can give you pneumonia.

meningitis

Meningitis is a swelling in the thin layers of tissue that surround your brain and your spinal cord. It usually happens because of an infection with certain kinds of bacteria or viruses. Meningitis can give you a severe headache and a stiff neck. And you may find it difficult to keep your eyes open in the light. Meningitis is a life-threatening disease. If you have these symptoms, you should go to hospital straight away.

antibodies

Antibodies are an important part of your immune system. They are proteins made by white blood cells (another part of your immune system). They help destroy bacteria and other agents that cause infections.

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