

### **Introduction**

Meningitis is a very serious infection of the fluid that surrounds the brain and spinal cord. Meningitis can be fatal. However, if found early, meningitis can be treated.

This reference summary is for children and their parents. It will help you understand what causes meningitis in babies, children and teens, and how it can be diagnosed, treated, and prevented.

### **Meningitis**

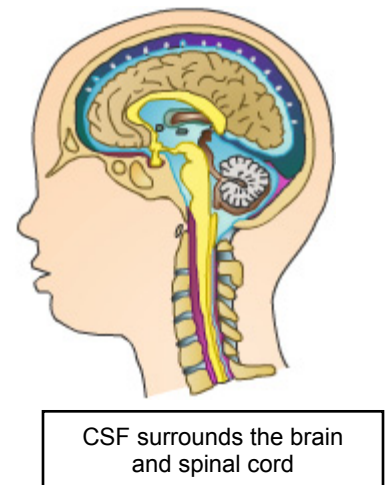
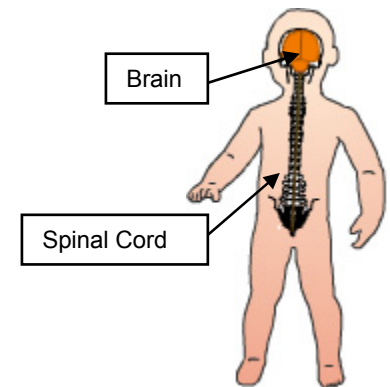
The brain and the spinal cord are the command centers of the body. They allow us to:

- speak
- hear
- understand
- see
- move
- feel

A clear fluid called cerebro-spinal fluid, or CSF, surrounds the brain and spinal cord. CSF is a clear fluid that looks like water. CSF acts as a shock absorber and protects the brain and spinal cord from injury.

Membranes called meninges protect the brain, spinal cord and CSF. Meninges help prevent CSF from leaking to the outside.

Meningitis is the infection of the CSF, the fluid surrounding the brain, and the spinal cord. People sometimes refer to meningitis as spinal meningitis.



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## Causes

Meningitis can be caused by a virus or bacteria. When a virus causes meningitis, it is called viral meningitis. When bacteria cause meningitis, it is called bacterial meningitis.

The following are some of the bacteria that can cause meningitis:

- Streptococcus pneumoniae
- Neisseria meningitidis
- Group B Streptococcus
- Listeria monocytogenes
- Haemophilus influenzae

Fortunately there are vaccines that help protect children from some of these bacteria.

It is important to know whether meningitis is caused by a virus or bacteria so it can be treated properly. Bacterial meningitis isn't as common as viral meningitis, but is serious and can be life-threatening if not treated right away. Viral meningitis is more common and can be less serious.

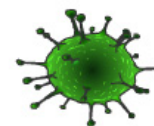
For bacterial meningitis, it is important to know what type of bacteria is causing the meningitis. Antibiotics are used to treat bacterial meningitis and can also prevent some types of bacteria from spreading and infecting other people.

## Symptoms

Symptoms can show up anywhere from several hours to a couple days after a child is infected. The symptoms of meningitis in children age 2 and older include:

- high fever
- headache
- stiff neck

Other symptoms of meningitis may include nausea, vomiting, difficulty seeing in bright light, confusion and sleepiness. Some of the symptoms of meningitis resemble the symptoms of other diseases of the brain, such as headache, sleepiness and confusion.



Virus



Bacteria

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In newborns and babies, the symptoms of fever, headache, and neck stiffness may be hard to notice, so other signs to watch for in babies include

- less active or more sleepy than normal
- irritable or more fussy than usual
- vomiting often
- not eating well

As meningitis progresses, children of any age could have seizures. Symptoms of seizures are different depending on what area of the brain the abnormal electrical activity happens in. Symptoms of seizures could include:

- a sudden, violent, uncontrollable jerking of the muscles, also known as convulsions
- sudden but brief loss of contact with a person's surroundings for a few moments, this could look like daydreaming or staring.

## Diagnosis

Early diagnosis and treatment of meningitis is very important in order to lessen serious complications. If symptoms occur, the patient should see a doctor immediately.

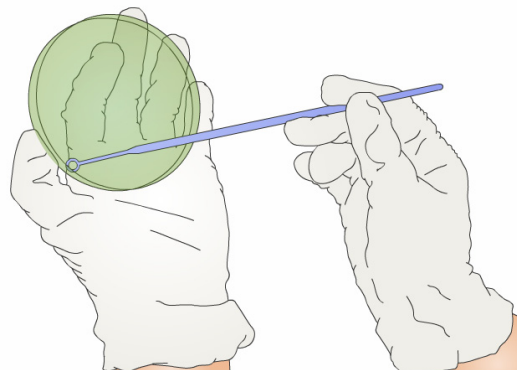
The doctor might suspect meningitis after talking to you about your child's health and activities, and doing a physical exam. Headache, neck stiffness and increased sleepiness are common signs of meningitis.

A spinal tap, where a needle is inserted into an area of the lower back and fluid from the spinal canal is withdrawn, is done in order to get a sample of the fluid for testing.

A sample of spinal fluid is sent to a lab to see if the meningitis bacteria exist.

It may take 1-2 days for bacteria in the spinal fluid to grow in the lab. Meanwhile, other tests on the spinal fluid can help the doctor decide whether the child has meningitis and whether it is from a bacteria or a virus.

Finding out what type of bacteria is causing the meningitis is important. It helps the doctor know which antibiotics to prescribe.



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A CAT scan of the brain may need to be done to make sure that symptoms are not due to other brain diseases such as tumors, bleeding or abscesses.

A blood test can also be done to check whether the white blood cell count is higher than normal. White blood cells help fight infections.

## Treatment

There are a number of antibiotics that treat bacterial meningitis. However, it is important that treatment is started early in the course of the disease.

Antibiotic treatment for most types of bacterial meningitis reduces the risk of dying from meningitis to below 15%.

The antibiotics are given intravenously and are usually started as soon as the diagnosis is suspected. Once the bacteria are identified, the antibiotics can be changed if needed.

The child is also usually given IV fluid and watched closely. The spinal tap may have to be repeated to make sure that the meningitis has been treated successfully.

Meningitis due to viruses is usually not as severe as bacterial meningitis. It does not usually require any antibiotics or antiviral medications; the child is treated with IV fluids and rest and watched closely.

## Complications

Bacterial meningitis tends to have a much higher risk of complications than viral meningitis.

Meningitis can affect the hearing nerve, causing permanent deafness.

Meningitis could also lead to severe brain damage, learning disability or even death. Fortunately, early diagnosis and treatment can help lessen these complications.



## Spreading Infection

Some forms of bacterial meningitis are contagious, meaning they can spread from person to person. Bacteria can be spread during coughing or kissing. It can also happen if the person who has meningitis shares anything that has their saliva on it,

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such as a fork, spoon or glass.

Fortunately, the bacteria that cause meningitis are not usually as contagious as the common cold or flu. They are also not spread by casual contact such as breathing the air where a person with meningitis has been.

Sometimes the bacteria that cause meningitis spread to people who have had close contact with the child who has it. People who are at increased risk of catching meningitis from a child or teen include:

- household members
- anyone in the same daycare
- anyone in direct contact with saliva, such as a boyfriend or girlfriend



People who are in close contact with a child who has some types of bacterial meningitis should get antibiotics to protect themselves.

Meningitis cases are reported to state or local health departments to ensure follow-up of close contacts and protect against outbreaks.

Although large epidemics of meningitis do not typically occur in the United States, some countries experience large epidemics. An epidemic is when a disease spreads through a big portion of a population. Overseas travelers should check to see if a vaccine against meningitis is recommended for their trip.

## Vaccination

There are vaccines against some of the bacteria that cause meningitis. They are very safe and effective. Ask your doctor if your child should be vaccinated against meningitis.

Any child who will be traveling to areas that could have an epidemic of meningitis should be vaccinated at least 1 week before they leave. Recommendations about areas where the meningitis vaccine would be useful can be obtained by calling the Centers for Disease Control and Prevention.



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There are vaccines that help protect against some of the bacteria that used to cause a majority of the cases of bacterial meningitis. These include vaccines against *Streptococcus pneumoniae*, *Neisseria meningitidis*, and *Haemophilus influenzae*.

## Summary

Meningitis is an infection of the fluid surrounding the brain and the spinal cord. It can be a very serious and sometimes fatal disease for children.

Understanding and recognizing the symptoms of meningitis is important for early diagnosis. The earlier the diagnosis and treatment are, the less likely complications of the disease will happen. Headache, neck stiffness, eye sensitivity to light, increased sleepiness and unresponsiveness are all signs of meningitis.

Knowing whether meningitis is caused by a virus or bacteria is important in choosing treatment. Viral meningitis can be less severe and cannot be treated with antibiotics, while bacterial meningitis can be quite severe and is treated with antibiotics. Meningitis may cause brain damage, hearing loss or learning disability.

Treatment of bacterial meningitis involves antibiotics. Vaccines are also available to prevent certain types of bacterial meningitis. Ask your doctor if your child should be vaccinated against meningitis.

If your child will be traveling overseas, particularly to developing countries in Africa, ask your doctor or call the Centers for Disease Control and Prevention to check if your child should be vaccinated.



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