



Understanding **Pneumococcal Disease and Vaccines**

For parents and guardians

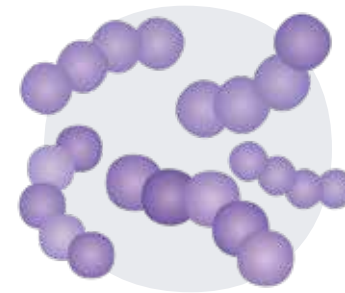
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What is pneumococcal disease?



Pneumococcal disease is an infection caused by the bacteria *Streptococcus pneumoniae*. There are over 100 different types, or strains, of *Streptococcus pneumoniae* (*S. pneumoniae*).

Although pneumococcal infection can be mild, it can also cause serious and even deadly diseases. Serious infections in the blood, lungs, and the lining of the brain and spinal cord can result in hospitalization, lifelong disability, and even death.



Mild infections	Sinusitis A sinus infection	
	Otitis media A middle ear infection	
Serious infections	Pneumonia A lung infection	
	Bacteremia A blood infection	
	Meningitis An infection of the lining of the brain and spinal cord	

What are the symptoms of pneumococcal disease?

Pneumococcal disease can include many different types of infections. Symptoms depend on the part of the body that is infected.

Mild infections		Serious infections		
Sinusitis A sinus infection	Otitis media A middle ear infection	Pneumonia A lung infection	Bacteremia A blood infection	Meningitis An infection of the lining of the brain and spinal cord
Symptoms				
<ul style="list-style-type: none"> • Stuffy or runny nose • Headache • Loss of sense of smell • Facial pain or pressure 	<ul style="list-style-type: none"> • Ear pain • A red, swollen ear drum • Fever • Sleepiness 	<ul style="list-style-type: none"> • Fever • Chills • Cough • Rapid breathing or difficulty breathing • Chest pain 	<ul style="list-style-type: none"> • Fever • Chills • Low alertness 	<ul style="list-style-type: none"> • Stiff neck • Fever • Headache • Sensitivity to light • Confusion • Low appetite, poor drinking, or vomiting in babies

Who is most at risk for pneumococcal disease?

Pneumococcal disease is a major public health problem worldwide. Age, medical conditions, and other factors can increase someone's risk for pneumococcal disease and severe infections.

People at increased risk for pneumococcal disease include:



Children younger than 5 years of age



Adults 65 years or older

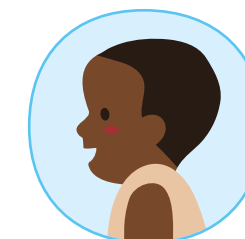


People with weakened immune systems

Some children are at a higher risk than others. Experts do not know why, but children of certain racial and ethnic groups also have increased rates of pneumococcal disease:



Alaska Native people



African American people



American Indian people

Also, young children attending childcare are at increased risk for serious pneumococcal infection.

How does pneumococcal disease spread?

Pneumococcal disease is contagious. People spread *S. pneumoniae* bacteria to someone else through droplets of saliva and/or mucus when they:



Cough.

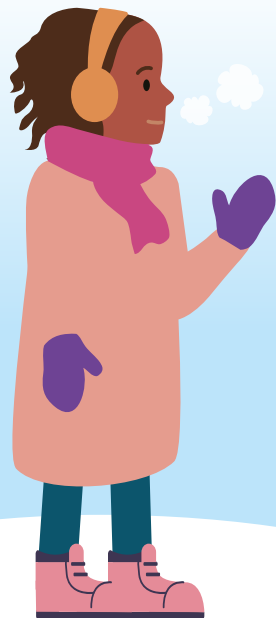


Sneeze.



Touch each other, share objects, or kiss.

Many healthy people, especially children, have the bacteria in their nose or throat at one time or another without being ill. This is called carriage. Illness develops when the bacteria spread and cause infection in the body.

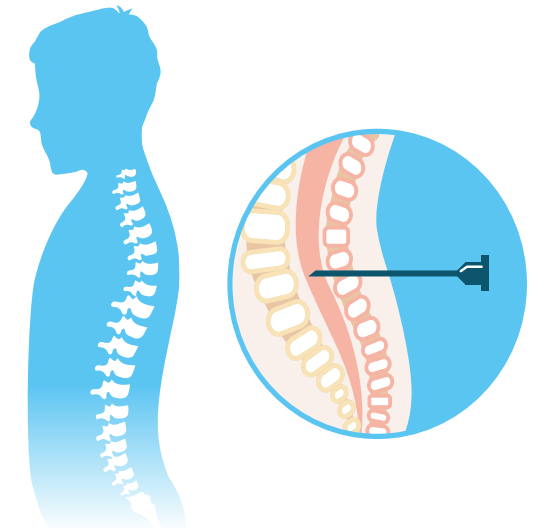


Pneumococcal infections are more common during winter and in early spring when respiratory diseases are more frequent.

How is pneumococcal disease diagnosed?

The diagnosis is made by finding *S. pneumoniae* in the blood, infected fluid, or phlegm. Isolating and growing the bacteria in a laboratory helps identify the specific type of bacteria causing the infection. Knowing the cause helps doctors choose the right treatment.

If doctors suspect serious pneumococcal disease, like meningitis or bacteremia, they will collect samples of cerebrospinal fluid (the fluid that surrounds the brain and spinal cord) or blood.



Doctors can use a urine test to help make a diagnosis of pneumococcal pneumonia.



Doctors usually diagnose ear and sinus infections based on a history and physical exam findings that support pneumococcal infection.

How is pneumococcal disease treated?



Antibiotics are used to treat pneumococcal disease. Treatment may start with a broad-spectrum antibiotic, which works against a wide range of bacteria. After testing, and once more information is known about the specific strain of bacteria, a more targeted antibiotic may be selected.

For mild infections, your doctor may also recommend:



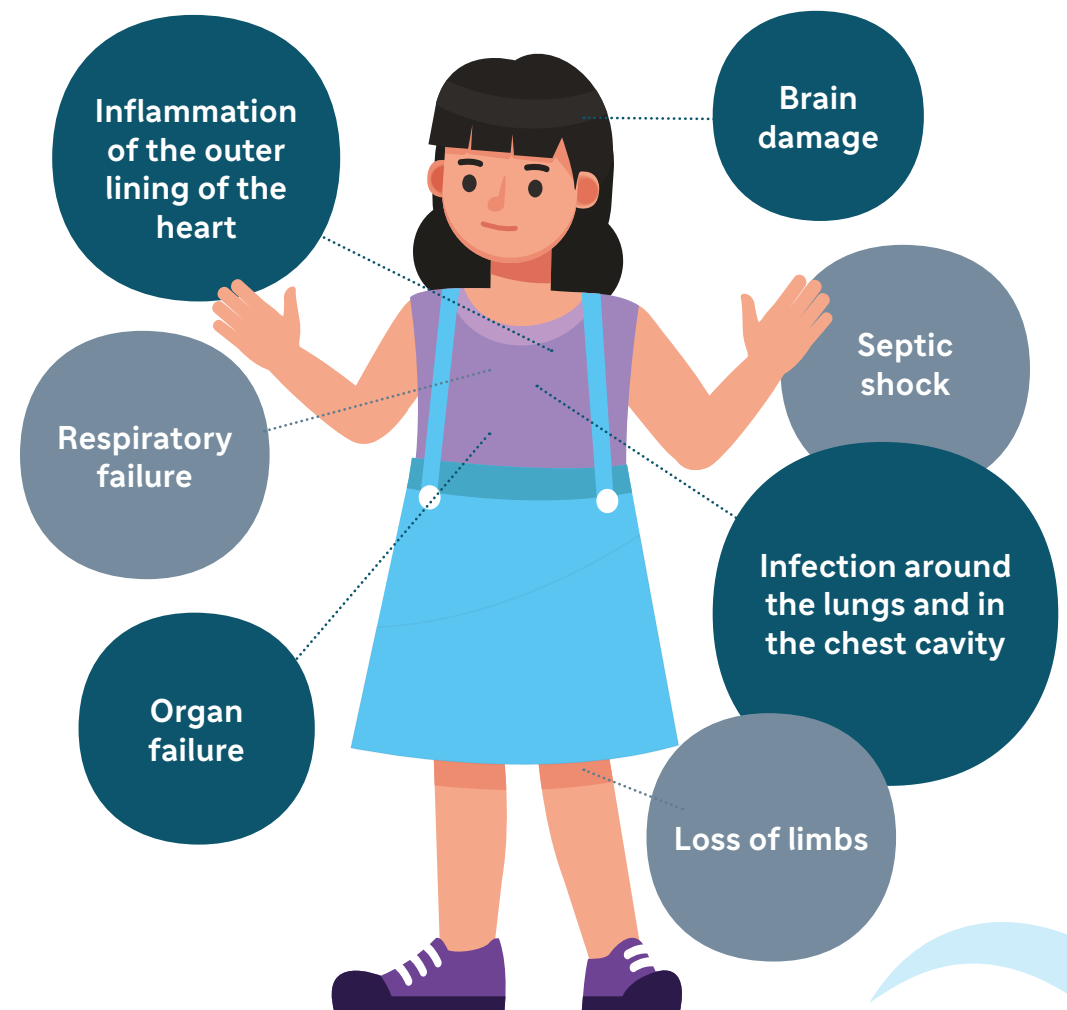
In the 1940s, all the strains of *S. pneumoniae* could be treated with the antibiotic penicillin. Over time, many pneumococcal strains have become resistant not only to penicillin, but also to other antibiotics developed to combat bacterial infections. Resistance means that the bacteria have changed, or evolved, so that they are no longer killed by one or more antibiotics. As a result, treatment with those antibiotics is not effective against resistant strains. Experts estimate that nearly one-third of *S. pneumoniae* are antibiotic-resistant.



What complications can pneumococcal disease cause?

Even with antibiotic treatment, pneumococcal disease can be deadly. About 1 in 12 children who get pneumococcal meningitis die of the infection. Pneumococcal pneumonia kills about 1 in 20 who get the disease.

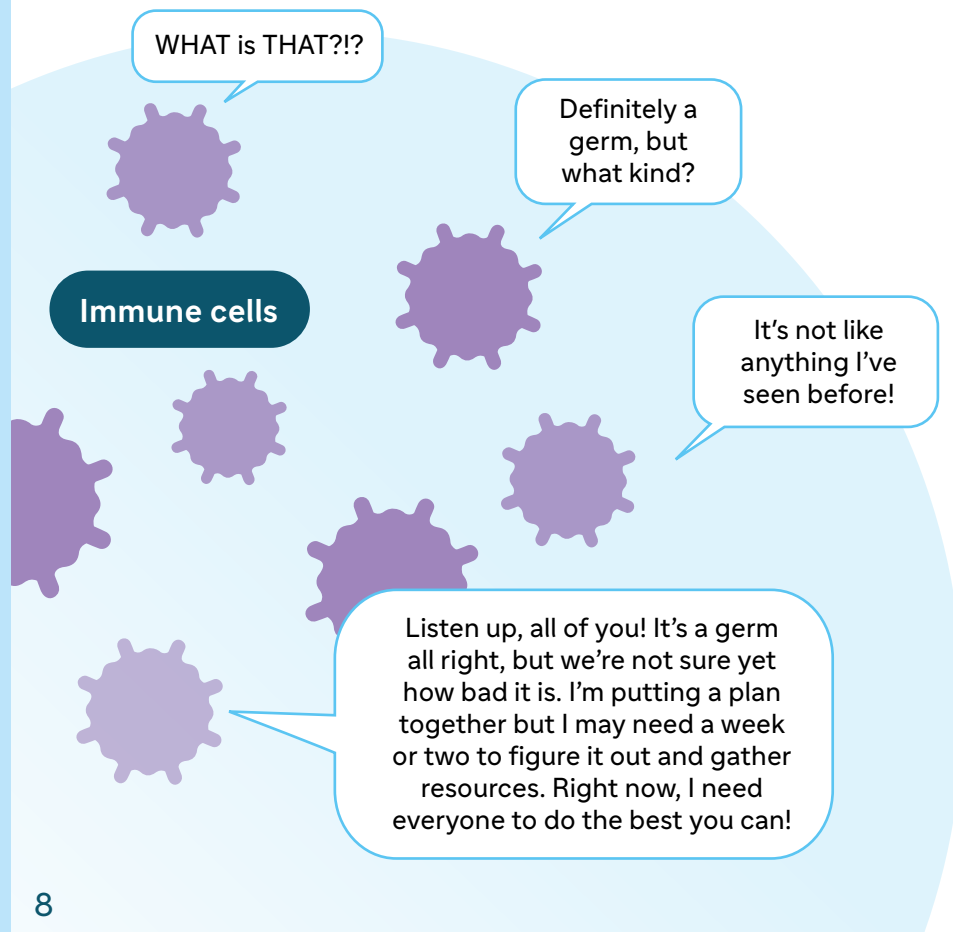
Those who survive may have long-term problems.



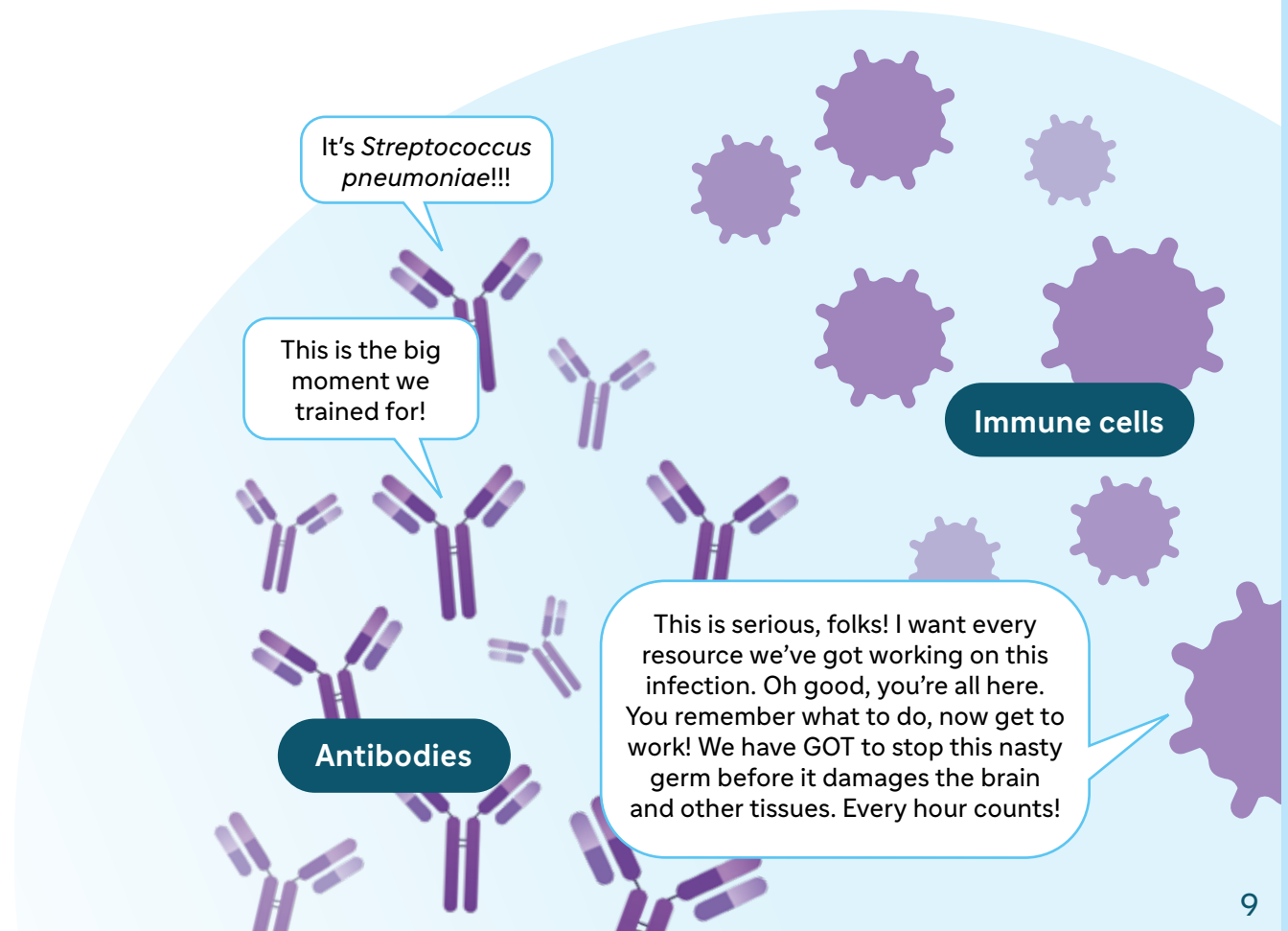
Vaccination is the best way to prevent pneumococcal disease.

It gives your immune system a head start against a potentially deadly infection.

1 NATURAL IMMUNITY (IMMUNE RESPONSE IN UNVACCINATED INDIVIDUALS)



2 IMMUNE RESPONSE IN VACCINATED INDIVIDUALS



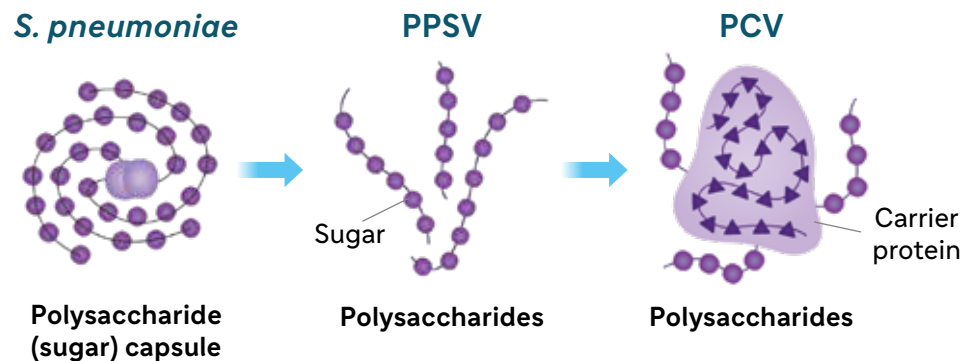
What types of pneumococcal vaccines are available?

There are 2 main types of pneumococcal vaccines. Both are made from polysaccharides (sugars) surrounding the bacteria.

- Polysaccharide vaccine (PPSV)
- Pneumococcal conjugate vaccines (PCVs)

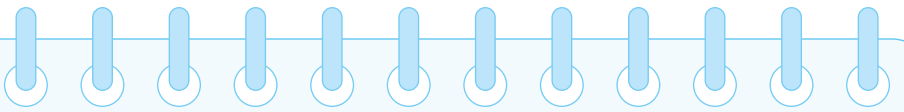
PPSV was the first type of vaccine created and contains polysaccharides as its antigen (substance that induces an immune response in the body). It activates only part of the immune system, which means that protection is short-lived. PPSV vaccines don't work in children younger than 2 years of age.

PCVs, or conjugate vaccines, contain polysaccharides and a carrier protein. This helps to activate more of the immune system for longer-lasting, more robust protection. PCVs do provide protection to children younger than 2 years of age.



While currently-available vaccines are effective, scientists are constantly looking for ways to update and improve them. The types of pneumococcal bacteria known to cause serious disease are increasing. Scientists are working to develop a vaccine that can provide a wider range of long-lasting protection against the most serious pneumococcal diseases.

Putting it all together



- Pneumococcal disease is an infection caused by the bacteria *S. pneumoniae*. Although pneumococcal infection can be mild, it can also cause serious and even deadly diseases.
- Serious infections in the blood, lungs, and the lining of the brain and spinal cord can result in hospitalization, lifelong disability, and even death.
- Children under 5 years of age, adults over 65 years of age, and people with weakened immune systems are most at risk for pneumococcal disease.
- Pneumococcal disease spreads when an infected person coughs or sneezes. People who are infected but don't have any symptoms can also spread the disease.
- Antibiotics are used to treat pneumococcal disease, but nearly one-third of *S. pneumoniae* are antibiotic-resistant.
- Vaccination is the best way to protect against pneumococcal disease.
- There are 2 main types of pneumococcal vaccines. While currently-available vaccines are effective, scientists are constantly looking for ways to update and improve them.

Glossary

- **Antibiotic resistance:** The bacteria have changed so that they are no longer killed by one or more antibiotics.
- **Antibody:** Proteins that protect you when an unwanted substance enters your body. Produced by your immune system, antibodies bind to these unwanted substances in order to eliminate them from your body.
- **Antigen:** A toxin or other foreign substance that causes an immune response in the body, especially the production of antibodies.
- **Bacteremia:** When there are bacteria in the blood.
- **Conjugate vaccine:** A type of subunit vaccine that combines a weak antigen with a stronger carrier protein so that the immune system has a stronger response to the weak antigen.
- **Carriage:** When healthy people have bacteria in their nose or throat at one time or another without being ill.
- **Meningitis:** An infection of the fluid and membranes surrounding the brain and spinal cord.
- **Otitis media:** An infection of the middle ear.
- **Pneumonia:** An infection in the lungs.
- ***Streptococcus pneumoniae (S. pneumoniae):*** Bacteria that cause pneumococcal disease.
- **Sinusitis:** An infection in the tissues of the sinuses.
- **Vaccine:** Injections (shots), liquids, pills, or nasal sprays that you take to teach your body's immune system to recognize and defend against harmful germs.

