

Viral and Bacterial Meningitis

Meningitis is an inflammation of the membranes that cover the brain and spinal cord. The inflammation is most often caused by a virus or bacterial infection. An accurate diagnosis is essential because the severity of illness and treatment depends on the cause.

Viral meningitis is a serious illness. However, it typically is less severe than bacterial meningitis and usually resolves within 10 days of onset in people with sound immune systems. Antibiotics are not effective in the treatment of viral meningitis.

While antibiotics can be effective in the treatment of bacterial meningitis, early intervention is essential. Bacterial meningitis can result in detrimental health effects including brain damage, hearing loss or learning disabilities.

Viral Meningitis

Different types of viral infections cause viral meningitis. Non-polio enteroviruses are believed to be responsible for about 85 percent of viral meningitis cases in the United States, occurring most often in summer and fall months. Most people who are infected by enteroviruses do not develop meningitis.

Other types of viruses that can cause meningitis include mumps, herpes, measles, influenza and arboviruses (West Nile virus).

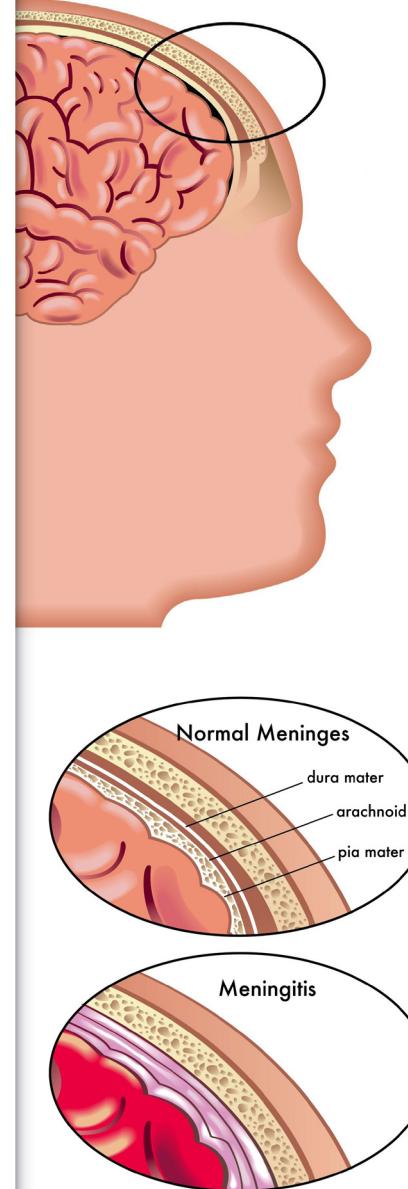
Exposure Risk

An estimated 10 to 15 million symptomatic enteroviral infections occur annually in the U.S., including 30,000 to 75,000 cases of viral meningitis, according to the Centers for Disease Control and Prevention (CDC). While meningitis can occur at any age, those considered at higher risk include children under 5 years old, people with immune systems that have been weakened by diseases or medications (such as chemotherapy), and recent transplant patients.

Enteroviruses are most often spread through direct contact with an infected person's stool. For example, an adult may be exposed while changing an infected infant's diaper.

Enteroviruses and other viruses can also be spread through direct or indirect contact with respiratory secretions (saliva, sputum and nasal mucus).

An individual who is exposed to someone with viral meningitis may be at risk of becoming infected with the virus that caused it but have only a small chance of developing meningitis.



Signs and Symptoms

It typically takes three to seven days to develop symptoms of an enterovirus infection. Symptoms of viral meningitis can appear quickly or take several days to manifest, often preceded by a runny nose, diarrhea and/or vomiting.

These symptoms typically last from seven to 10 days. An infected person is usually contagious from the time they develop symptoms until the symptoms are gone. However, young children and people with compromised immune systems can spread an infection even after the symptoms have resolved.

Diagnosis and Treatment

Viral meningitis is diagnosed using laboratory tests (e.g., blood, urine, stool, sputum and lumbar puncture to obtain cerebrospinal fluid).

There is no specific treatment for viral meningitis. Physicians often recommend rest, plenty of fluids, and non-steroidal anti-inflammatory drugs to relieve fever and headache.

Prevention

There is no vaccine to protect people from acquiring a non-polio enterovirus infection or from viral meningitis. However, vaccination helps combat infections caused by measles, mumps and varicella viruses. Following good hygiene practices also helps reduce the spread of viruses that cause meningitis:

- Wash hands often in soap and water for at least 20 seconds. This is especially important after changing diapers, using the toilet, coughing or sneezing.
- Disinfect potentially contaminated surfaces like door handles and changing tables.
- Cover sneezes and coughs with a tissue or sleeve; immediately dispose of tissues.
- Stay home from work or school when feeling ill.

Infection control and isolation practices issued by the CDC's Healthcare Infection Control Practices Advisory Committee apply to health-care personnel who may be exposed to any type of meningitis.

Common Symptoms *in adults may differ from those in children*

Infants and young children:

- Fever
- Irritability
- Poor appetite
- Hard to waken
- Lethargy

Older children and adults:

- High fever
- Severe headache
- Stiff neck
- Sensitivity to bright light
- Sleepiness or trouble waking
- Nausea, vomiting
- Poor appetite
- Lethargy

Bacterial Meningitis

The leading causes of bacterial meningitis, a serious and potentially fatal illness, vary by the age of patients. In the U.S., the pathogens most commonly associated with bacterial meningitis are:

- *Haemophilus influenzae* (Hib)
- *Listeria monocytogenes*
- Group B *Streptococcus*
- *Streptococcus pneumonia* (pneumococcal)
- *Neisseria meningitidis* (meningococcal)

Someone who has meningitis may also have meningococcal disease (a rare blood infection). Meningococcal disease occurs in small clusters around the world. According to the World Health Organization, sub-Saharan Africa has the highest rates of meningococcal disease. There are several vaccines to help prevent potentially fatal meningococcal disease, which is treated as a medical emergency.

Exposure Risk

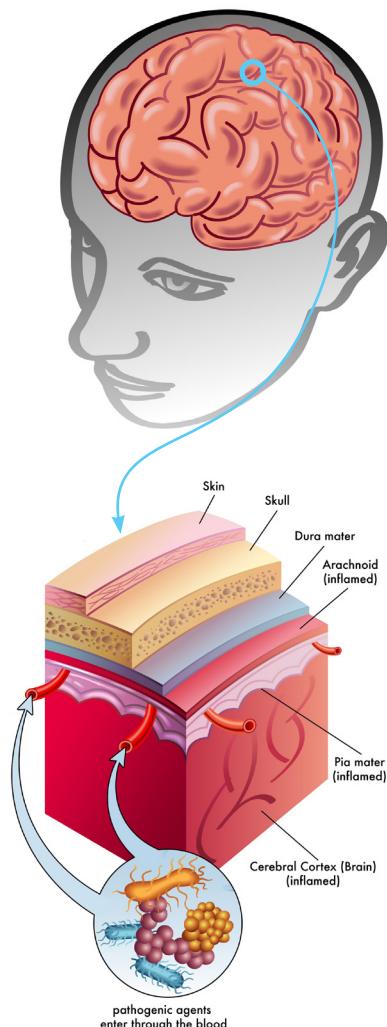
Some but not all forms of bacterial meningitis are contagious. Bacteria is commonly spread from person-to-person through the exchange of respiratory and throat secretions via coughing, sneezing and kissing. None of the bacteria that cause meningitis are as contagious as the common cold or flu. The bacteria are not spread by casual contact or breathing the air where a person with meningitis has been.

In general, people considered at higher risk of acquiring bacterial meningitis include:

- Those who have close contact with a patient who has a highly contagious form of bacterial meningitis
- Anyone over the age of 60 (slightly higher risk of becoming infected)
- Anyone with a chronic medical condition, particularly those that affect the immune system, such as diabetes

In the workplace, casual contact or exposure to a person with bacterial meningitis does not increase the risk of contagion. Business travelers to sub-Saharan Africa or Mecca during annual pilgrimages are considered at elevated risk and should follow recommended precautions.

In the U.S., about 4,100 cases of bacterial meningitis, including 500 deaths, occurred between 2003-2007. In 2011, the CDC reported the incident rate of bacterial meningitis had declined by nearly one-third over the last decade, due in part to the introduction of a pneumococcal conjugate vaccine that protects children from *Streptococcus pneumoniae*. An even more dramatic decline followed the introduction of a vaccine targeting *Haemophilus influenza* type B (Hib); between the mid-1980s and mid-1990s, bacterial meningitis cases in the U.S. reportedly dropped by 55 percent.



Signs and Symptoms

Symptoms of bacterial meningitis are similar to those of viral meningitis. Upper respiratory infection precedes other symptoms including:

- Headache
- Extremely stiff neck
- Fever and chills
- Intolerant to bright lights
- Nausea and vomiting
- Seizures or other neurological issues
- Confusion

Diagnosis and Treatment

Bacterial meningitis typically is diagnosed by growing bacteria from a sample of spinal fluid. It is important to identify which type of bacteria is causing the meningitis because antibiotics can help prevent some types from spreading and infecting other people. Public health officials report that appropriate antibiotic treatment for the most common types of bacterial meningitis should reduce the risk of dying to less than 15 percent, although fatality risk is higher among the elderly.

Prevention

Antibiotics are generally recommended as a preventive measure for individuals exposed to a person with meningitis caused by the bacteria *Neisseria meningitidis* or certain forms of *Haemophilus*. Only people who have been in close contact with saliva or respiratory secretions such as household members, intimate contacts, health-care personnel performing mouth-to-mouth resuscitation and day care center playmates are recommended to obtain a prescription for a specific antibiotic from a physician or through a public health department.

Distribution of antibiotics is generally not considered necessary in the workplace. When an infected employee returns to work, he or she does not create a health threat to other workers. Most cases of bacterial meningitis are isolated.

Resources

Centers for Disease Control and Prevention: www.cdc.gov/meningitis/

Guidelines for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007): www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf

Recommendations for Protecting Outdoor Workers from West Nile Virus Exposure (NIOSH): www.cdc.gov/niosh/docs/2005-155/pdfs/2005-155.pdf

World Health Organization: www.who.int/topics/meningitis/

