

# Meningitis

**M**eningitis (infection of the coverings of the brain and spinal cord) is a serious illness. Meningitis can occur in adults and children, even in infants, and can be caused by viruses, bacteria, fungi, or parasites. Bacterial meningitis can be fatal or cause severe impairment, particularly if the diagnosis of bacterial meningitis is delayed, but can be treated, especially when diagnosed early in the disease. The common types of bacteria that can cause meningitis are *Neisseria meningitidis* (also known as meningococcus) and *Streptococcus pneumoniae* (pneumococcus). These bacteria are highly contagious, spread rapidly, and can be deadly. Nursing homes, college dormitories, day care centers, and schools are often sites of outbreaks of meningitis. Vaccines are available for some bacteria and can be helpful to stop spread of contagious meningitis. The January 3, 2007, issue of *JAMA* includes an article about meningitis in children.

## SIGNS AND SYMPTOMS OF MENINGITIS

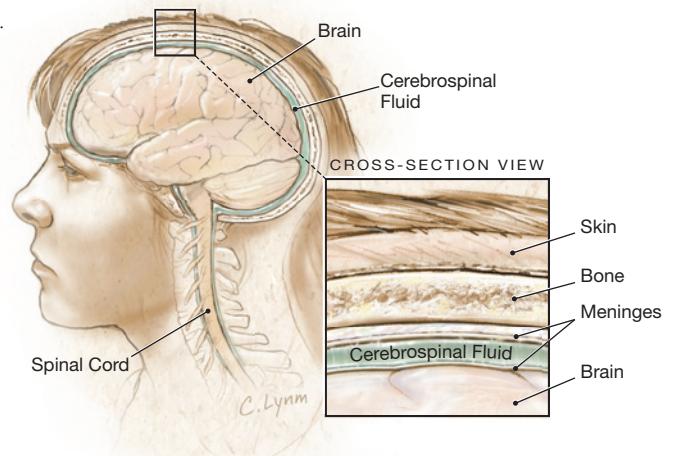
- Stiff neck
- Fever
- Headache
- Nausea and vomiting
- Red or purple rash that does not change color if pressed on
- Fatigue or extreme sleepiness
- Seizures
- Irritability or lethargy—in infants, along with poor feeding, may be the only symptoms of meningitis
- Recent flu-like illness or an ear or sinus infection may precede the development of meningitis

## DIAGNOSIS AND TESTING

- Questions about the history of the illness and a physical examination help determine the likelihood of meningitis.
- **Lumbar puncture** (sampling of the cerebrospinal fluid [CSF]) is the primary test for meningitis and is important for the critical distinction between a bacterial or viral cause. A small needle is inserted into the lower back under sterile conditions and CSF is withdrawn. The CSF may show the presence of bacteria, indicating bacterial infection. White blood cells in the CSF may be related to bacterial meningitis, viral meningitis (no bacteria would be seen in this case), or fungal meningitis. The CSF also is cultured to look for growth of organisms in order to identify them.
- Blood tests may show an increased white blood cell count, indicating infection. Other tests may be suggested by your doctor depending on the individual situation.

## TREATMENT

If bacterial meningitis is suspected based on the lumbar puncture results, immediate antibiotic therapy is necessary. **Intravenous** (through a vein into the bloodstream) antibiotics are given to penetrate into the CSF that bathes the spinal cord and brain. Supportive therapy, including medications to reduce fever, can help with other types of meningitis. In serious cases of meningitis, intensive care (including life support medications and ventilators) may be necessary.



## FOR MORE INFORMATION

- National Institute of Neurological Disorders and Stroke  
[www.ninds.nih.gov](http://www.ninds.nih.gov)
- American Academy of Pediatrics  
[www.aap.org](http://www.aap.org)
- Centers for Disease Control and Prevention  
[www.cdc.gov](http://www.cdc.gov)

## INFORM YOURSELF

To find this and previous JAMA Patient Pages, go to the Patient Page Index on JAMA's Web site at [www.jama.com](http://www.jama.com). Many are available in English and Spanish. A Patient Page on lumbar puncture was published in the October 25, 2006, issue.

Sources: National Institute of Neurological Disorders and Stroke; Centers for Disease Control and Prevention; American Academy of Pediatrics; American Academy of Family Physicians

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