



In 1987, tens of thousands of people gathered in Saudi Arabia for the annual Hajj pilgrimage. But what started out as a celebration led to a health crisis: just a few days after the pilgrimage, more than 2,000 cases of meningitis broke out spreading across Saudi Arabia and the rest of the world. The outbreak was so fierce that it was believed to have sparked a wave of deadly meningitis epidemics that ultimately infected tens of thousands of people worldwide. Meningitis is the inflammation of the meninges, three tissue layers responsible for protecting the brain and spinal cord. What makes meningitis so dangerous compared to other diseases is the sheer speed with which it invades a person's body. In the worst cases, it causes death within a day. Fortunately, that's rare for patients who receive early medical treatment.

## Why is Meningitis so Dangerous?

The disease primarily comes in three forms: fungal, viral, and bacterial – the last being the most deadly by far, and what we'll focus on. People usually contract bacterial meningitis by breathing in tiny particles of mucus and saliva that spray into the air when an infected person sneezes or coughs. It can also be transmitted through kissing, or sharing cigarettes, toothbrushes or utensils. Some people can be infected and carry the disease without showing symptoms or getting sick, which helps the disease spread quickly to others. Once the bacteria enter the nose, mouth, and throat, they cross the surrounding membranes and enter the bloodstream. From there, bacteria have rapid access to the body's tissues – including a membrane called the blood-brain barrier. This is made of a tight mesh of cells which separate blood vessels from the brain, and block everything except for a specific set of particles, including water molecules and some gases.

But in ways that scientists are still trying to understand, meningitis bacteria can trick the barrier into letting them through. Inside the brain, the bacteria swiftly infect the meninges. This triggers inflammation as the body's immune response kicks into overdrive, bringing on fever and intense headaches. As swelling in the meninges worsens, the neck begins to stiffen. Swelling in the brain disrupts its normal function – causing symptoms like hearing loss and extreme light sensitivity. As pressure increases in the cranium, it may also make the person confused – one of the hallmarks of the disease. A few hours in, the rapidly multiplying bacteria start to release toxins, leading to septicemia, also known as blood poisoning. This breaks down blood vessels, letting blood seep out and form what starts out looking like a rash, and evolves into big discoloured blots beneath the skin. At the same time, these toxins burn through oxygen in the blood, reducing the amount that gets to major organs like the lungs and kidneys. That increases the chance of organ shut down – and alongside spreading septicemia, threatens death.

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That all sounds scary, but doctors are so good at treating meningitis that a visit to the hospital can drastically reduce an adult's risk of dying from it. The longer it's left untreated, though, the more likely it will lead to lasting damage. If declining oxygen levels cause cell death in extreme parts of the body – like fingers, toes, arms and legs – the risk of amputation goes up. And if bacterial toxins accumulate in the brain and trigger cell death, meningitis could also cause long-term brain damage and memory loss. So fast treatment, or better yet, prevention, is critical. That's why most countries have vaccines that defend against the disease in its deadliest forms. Those are usually given to the people who are most at risk – like young children, people with weak immune systems, or people who gather in large groups where an outbreak of meningitis could potentially happen.

In addition to those gatherings, meningitis is most common in a region called the meningitis belt that stretches across Africa, though cases do happen all over the world. If you're concerned that you or someone you know may have meningitis, get to the doctor as soon as possible; quick action could save your life.