CONDITION

Anthrax

Learn how anthrax spreads, the symptoms of its different forms, how it is diagnosed and treated, and when possible exposure requires urgent care.

WHAT IT IS
Serious bacterial infection

BODY SYSTEM
Skin, lungs, digestive and nervous systems

MAIN SYMPTOMS
Fever, painless black-centered sore, shortness of breath, abdominal pain

WHAT CAUSES IT
Infection with Bacillus anthracis spores

HOW IT IS DIAGNOSED
Bacterial culture or PCR of body samples

MAIN TREATMENT
Antibiotics and antitoxin medicines

CAN IT BE CURED?
Yes - antibiotics kill the bacteria

IS IT AN EMERGENCY?
Sometimes - trouble breathing or signs of shock

LONG-TERM OUTLOOK
Early treatment improves recovery, but systemic anthrax can be life-threatening

Overview

Anthrax is a serious infection caused by the bacterium Bacillus anthracis . The bacteria form spores, which are tough, inactive structures that can survive in soil and animal products for many years. If spores enter the body, they can become active, multiply, and release toxins that damage tissues.

People can develop anthrax when spores enter through broken skin, are inhaled, are swallowed in contaminated food, or are injected with a contaminated drug. These routes cause different forms of the disease:

Anthrax is uncommon in the United States, but it requires prompt medical and public health attention. Early treatment can greatly improve the chance of recovery. Antibiotics like amoxicillin or doxycycline kill the bacteria, while antitoxin medicines may help neutralize toxins

already released into the body.

Anthrax generally does not spread from one person to another. People who have shared the same environmental, animal, food, or drug exposure may still be at risk.

- Cutaneous anthrax affects the skin and is the most common form.
- Inhalation anthrax begins in the chest after spores are breathed in.
- Gastrointestinal anthrax affects the throat or digestive tract.
- Injection anthrax affects deep tissues after injection of a contaminated drug.
- Anthrax meningitis affects the membranes around the brain and spinal cord. It can complicate any form of anthrax.

Symptoms

Symptoms depend on how spores entered the body. They may begin within days, but inhalation anthrax can appear later because dormant spores may remain in the lungs before becoming active.

Cutaneous anthrax usually starts where spores entered a cut or scrape. Early symptoms may include itching and a small, raised bump that resembles an insect bite. The area may then develop blisters and a painless open sore with a black center, called an eschar . Significant swelling can occur around the sore. Fever, headache, and swollen lymph nodes are also possible.

Inhalation anthrax may begin with symptoms that resemble other respiratory illnesses, such as fever, fatigue, cough, muscle aches, or chest discomfort. Nasal congestion is less typical. The illness can progress to shortness of breath, heavy sweating, low blood pressure, confusion, or shock. Fluid may collect around the lungs.

Gastrointestinal anthrax can affect the mouth and throat or the lower digestive tract. Possible symptoms include:

Injection anthrax can cause severe swelling, redness, bruising, or pain at an injection site. Infection may spread deeply beneath the skin and into muscle. A typical black eschar may be absent. Fever, low blood pressure, and widespread infection can develop.

Anthrax meningitis may cause severe headache, neck stiffness, vomiting, confusion, unusual sleepiness, seizures, or loss of consciousness.

Possible anthrax exposure should be discussed with a clinician or public health department immediately, even if symptoms have not started. Preventive treatment may be time-sensitive.

Call emergency services for trouble breathing, fainting, severe confusion, seizures, rapidly worsening swelling, signs of shock, or severe abdominal symptoms with bloody vomit or stool.

- Sore throat, painful swallowing, or neck swelling
- Fever, nausea, vomiting, or loss of appetite
- Abdominal pain or swelling
- Diarrhea, which may contain blood
- Vomit that may contain blood

Causes and risk factors

Anthrax is caused by contact with Bacillus anthracis spores. The bacteria occur naturally in soil in some parts of the world. Grazing animals such as cattle, sheep, and goats can become infected after encountering spores. People may then be exposed through infected animals or contaminated wool, hides, hair, meat, or other animal products.

Activities that may increase exposure risk include:

Laboratories and workplaces that handle the bacteria use special controls because spores can become airborne. Anthrax has also been used as a biological weapon, including the 2001 attacks involving contaminated letters in the United States.

Simply being near a person with anthrax does not usually create a risk. Cutaneous lesions should still be covered and handled according to medical guidance because drainage may contain bacteria. Public health officials assess who had a meaningful exposure and who needs preventive care.

- Handling infected livestock, carcasses, hides, wool, or animal products
- Working in certain veterinary, agricultural, laboratory, or animal-processing settings
- Traveling to or living in a region where livestock anthrax occurs
- Eating raw or undercooked meat from an infected animal
- Injecting contaminated drugs, particularly heroin associated with past European outbreaks
- Being present during an intentional release of anthrax spores

Diagnosis

A clinician will ask about symptoms, occupation, travel, animal contact, food, injection drug use, and any known environmental or workplace exposure. Because anthrax is rare and may resemble other conditions, this history is important.

Testing depends on the suspected form of infection. Blood, fluid from a skin lesion, tissue, fluid around the lungs, or spinal fluid may be examined. Laboratories can use bacterial culture and molecular tests, such as polymerase chain reaction, or PCR, to identify Bacillus anthracis . Samples are ideally collected before antibiotics begin, but testing should not delay urgent treatment.

Chest X-rays or computed tomography, known as CT, may show fluid around the lungs or widening in the center of the chest in inhalation anthrax. Imaging findings cannot confirm anthrax by themselves.

If meningitis is possible, clinicians may consider a lumbar puncture, also called a spinal tap, when it can be performed safely. Additional blood tests help assess organ function, inflammation, and complications.

Suspected anthrax is reported promptly to public health authorities. Specialized public health laboratories may confirm the diagnosis, help identify the exposure, and determine whether other people need evaluation.

Treatment and management

Treatment should begin as soon as anthrax is suspected. Clinicians do not always wait for final laboratory confirmation when the symptoms and exposure history are concerning.

Antibiotic treatment depends on the form and severity of the illness. A limited skin infection without systemic symptoms may sometimes be treated with one oral antibiotic. More severe skin disease, inhalation anthrax, gastrointestinal anthrax, injection anthrax, or suspected meningitis usually requires hospital care and a combination of intravenous antibiotics.

Combination treatment may include medicines that kill the bacteria and medicines that reduce bacterial protein production, which may help limit toxin formation. The exact regimen depends on the site of infection, whether meningitis is possible, laboratory results, allergies, pregnancy, age, and other medical factors. Patients should not use leftover antibiotics or try to choose a regimen without medical guidance.

Systemic anthrax may also be treated with an antitoxin . These medicines bind to anthrax toxin in the bloodstream. They do not replace antibiotics because they do not kill the bacteria. Antitoxin is generally coordinated through public health authorities and is most helpful when given early.

Supportive hospital treatment can include oxygen, intravenous fluids, medicines to support blood pressure, and mechanical ventilation. Fluid around the lungs may need repeated drainage. Deep injection-related infections may require surgery, although decisions about removing infected or damaged tissue are individualized.

People exposed to aerosolized spores may need post-exposure prophylaxis , meaning treatment intended to prevent illness before symptoms develop. Because inhaled spores can remain inactive for an extended period, public health guidance may recommend a prolonged antibiotic course, sometimes up to 60 days, along with an anthrax vaccine series for eligible people. The plan depends on how the exposure occurred and whether it is considered credible.

Anthrax vaccine is not routinely given to the general public. It may be offered before exposure to certain military personnel, laboratory workers, and others whose work creates an ongoing risk.

Medicines commonly used for this include levofloxacin . Which one suits you, if any, is a decision for you and your doctor.

Complications

Without prompt treatment, anthrax bacteria and toxins can spread through the bloodstream. This may cause sepsis, a dangerous body-wide response to infection, as well as shock and failure of multiple organs.

Other complications depend on the form of disease:

Even with treatment, systemic anthrax can be life-threatening. Early recognition, antibiotics, antitoxin when appropriate, and intensive supportive care improve outcomes.

- Skin infection can cause extensive swelling or spread into the bloodstream.
- Swelling from a head, neck, or throat infection can affect the airway.
- Inhalation anthrax can cause respiratory failure and fluid around the lungs.
- Gastrointestinal anthrax can cause severe bleeding, bowel damage, or perforation.
- Injection anthrax can destroy deep tissue and cause severe bloodstream infection.
- Anthrax meningitis can cause bleeding around the brain, seizures, coma, or lasting neurologic injury.

Follow up

Follow-up depends on whether a person was treated for confirmed disease or received preventive care after an exposure.

Take prescribed antibiotics for the full recommended period unless the treating clinician changes the plan. This is especially important after inhalation exposure because spores may become active after a person initially feels well. Attend all vaccine appointments if vaccination is part of the public health plan.

Routine follow-up may include checking that symptoms are resolving, monitoring skin healing, reviewing laboratory results, and watching for medicine side effects. People recovering from severe anthrax may need additional care for weakness, breathing problems, wound healing, or effects on the nervous system.

Contact the treating team promptly if symptoms return, a skin lesion or swelling worsens, fever develops, or medicine side effects make it difficult to continue treatment. Before stopping an antibiotic, contact the clinician or public health team that arranged it.

Seek emergency care for new breathing difficulty, severe chest or abdominal pain, bloody vomit or stool, fainting, confusion, seizures, rapidly increasing neck or limb swelling, or other signs of sudden deterioration.

Public health officials may also follow up to clarify where the exposure occurred, identify potentially exposed people, and confirm that preventive treatment has been completed. This does not mean the infection is spreading from person to person.

Sources

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