



Guide to Understanding Anthrax

Infectious Disease - Anthrax

National Center for Emerging and Zoonotic Infectious Diseases



**U.S. Department of
Health and Human Services**
Centers for Disease
Control and Prevention

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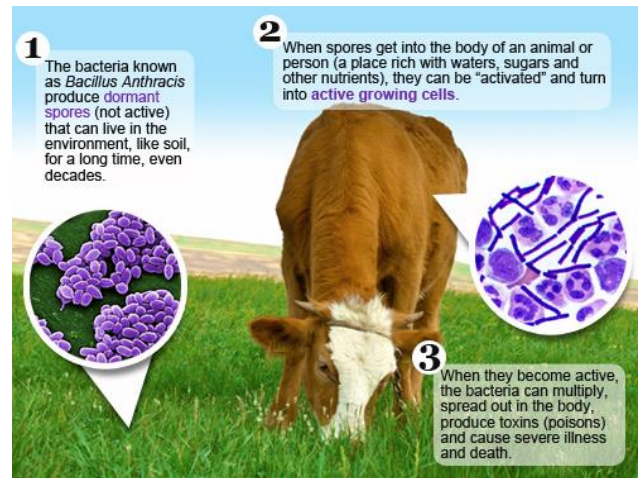
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Basic information

What is anthrax?

Anthrax is a serious infectious disease caused by gram-positive, rod-shaped bacteria known as *Bacillus anthracis*. Anthrax can be found naturally in soil and commonly affects domestic and wild animals around the world. Although it is rare in the United States, people can get sick with anthrax if they come in contact with infected animals or contaminated animal products. Contact with anthrax can cause severe illness in both humans and animals.

Anthrax is **not** contagious, which means you can't catch it like the cold or flu.



How do animals get infected with anthrax?

Domestic and wild animals such as cattle, sheep, goats, antelope, and deer can become infected when they breathe in or ingest spores in contaminated soil, plants, or water. In areas where domestic animals have had anthrax in the past, routine vaccination can help prevent outbreaks.

How do people get infected with anthrax?

People get infected with anthrax when spores get into the body. When anthrax spores get inside the body, they can be "activated." When they become active, the bacteria can multiply, spread out in the body, produce toxins (poisons), and cause severe illness.

This can happen when people breathe in spores, eat food or drink water that is contaminated with spores, or get spores in a cut or scrape in the skin. It is very uncommon for people in the United States to get infected with anthrax.

Certain activities can also increase a person's chances of getting infected. For more information, see "How people are infected" on page 4.

Where is anthrax found?

Anthrax is most common in agricultural regions of Central and South America, sub-Saharan Africa, central and southwestern Asia, southern and Eastern Europe, and the Caribbean.

Anthrax is rare in the United States, but sporadic outbreaks do occur in wild and domestic grazing animals such as cattle or deer. Anthrax is more common in developing countries and countries that do not have veterinary public health programs that routinely vaccinate animals against anthrax. In the United States, yearly vaccination of livestock is recommended in areas where animals have had anthrax in the past.

Types of anthrax

The type of illness a person develops depends on how anthrax enters the body. Typically, anthrax gets into the body through the skin, lungs, or gastrointestinal system. All types of anthrax can eventually spread throughout the body and cause death if they are not treated with antibiotics.



Cutaneous anthrax

When anthrax spores get into the skin, usually through a cut or scrape, a person can develop cutaneous anthrax. This can happen when a person handles infected animals or contaminated animal products like wool, hides, or hair. Cutaneous anthrax is most common on the head, neck, forearms, and hands. It affects the skin and tissue around the site of infection.

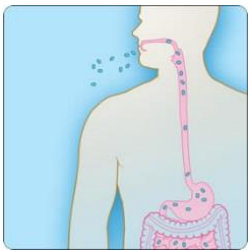
Cutaneous anthrax is the most common form of anthrax infection, and it is also considered to be the least dangerous. Infection usually develops from 1 to 7 days after exposure. Without treatment, up to 20% of people with cutaneous anthrax may die. However, with proper treatment, almost all patients with cutaneous anthrax survive.



Inhalation anthrax

When a person breathes in anthrax spores, they can develop inhalation anthrax. People who work in places such as wool mills, slaughterhouses, and tanneries may breathe in the spores when working with infected animals or contaminated animal products from infected animals. Inhalation anthrax starts primarily in the lymph nodes in the chest before spreading throughout the rest of the body, ultimately causing severe breathing problems and shock.

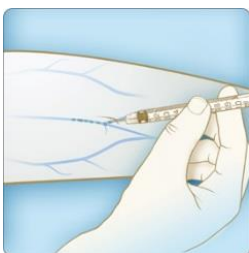
Inhalation anthrax is considered to be the most deadly form of anthrax. Infection usually develops within a week after exposure, but it can take up to 2 months. Without treatment, only about 10 - 15% of patients with inhalation anthrax survive. However, with aggressive treatment, about 55% of patients survive.



Gastrointestinal anthrax

When a person eats raw or undercooked meat from an animal infected with anthrax, they can develop gastrointestinal anthrax. Once ingested, anthrax spores can affect the upper gastrointestinal tract (throat and esophagus), stomach, and intestines.

Gastrointestinal anthrax has rarely been reported in the United States. Infection usually develops from 1 to 7 days after exposure. Without treatment, more than half of patients with gastrointestinal anthrax die. However, with proper treatment, 60% of patients survive.



Injection anthrax

Recently, another type of anthrax infection has been identified in heroin-injecting drug users in northern Europe. This type of infection has never been reported in the United States.

Symptoms may be similar to those of cutaneous anthrax, but there may be infection deep under the skin or in the muscle where the drug was injected. Injection anthrax can spread throughout the body faster and be harder to recognize and treat. Lots of other more common bacteria can cause skin and injection site infections, so a skin or injection site infection in a drug user does not necessarily mean the person has anthrax.

How people are infected

People get infected with anthrax when spores get into the body. When this happens, the spores can be activated and become anthrax bacteria. Then the bacteria can multiply, spread out in the body, produce toxins (poisons), and cause severe illness. This can happen when people breathe in spores, eat food or drink water that is contaminated with spores, or get spores in a cut or scrape in the skin.

Working with infected animals or animal products

Most people who get sick from anthrax are exposed while working with infected animals or animal products such as wool, hides, or hair.

Inhalation anthrax can occur when a person inhales spores that are in the air (aerosolized) during the industrial processing of contaminated materials, such as wool, hides, or hair.

Cutaneous anthrax can occur when workers who handle contaminated animal products get spores in a cut or scrape on their skin.

Eating raw or undercooked meat from infected animals

People who eat raw or undercooked meat from infected animals may get sick with gastrointestinal anthrax. This usually occurs in countries where livestock are not routinely vaccinated against anthrax and food animals are not inspected prior to slaughter.

In the United States, gastrointestinal anthrax has rarely been reported. This is because yearly vaccination of livestock is recommended in areas of the United States where animals have had anthrax in the past, and because of the examination of all food animals, which ensures that they are healthy at the time of slaughter.

Injecting heroin

A newly discovered type of anthrax is injection anthrax. This type of anthrax has been seen in northern Europe in people injecting heroin. So far, no cases of injection anthrax have been reported in the United States.

Is anthrax contagious?

No. You cannot catch anthrax from another person the way you might catch a cold or the flu. In rare cases, person-to-person transmission has been reported with cutaneous anthrax, where discharges from skin lesions might be infectious.

Symptoms of anthrax

The symptoms of anthrax depend on the type of infection and can take anywhere from 1 day to more than 2 months to appear. All types of anthrax have the potential, if untreated, to spread throughout the body and cause severe illness and even death.

Cutaneous anthrax symptoms can include:

- A group of small blisters or bumps that may itch
- Swelling around the sore
- A painless skin sore (ulcer) with a black center that appears after the small blisters or bumps. Most often the sore will be on the face, neck, arms, or hands.



Inhalation anthrax symptoms can include:

- Fever and chills
- Chest discomfort
- Shortness of breath
- Confusion or dizziness
- Cough
- Nausea, vomiting, or stomach pains
- Headache
- Sweats (often drenching)
- Extreme tiredness
- Body aches



Gastrointestinal anthrax symptoms can include:

- Fever and chills
- Swelling of neck or neck glands
- Sore throat
- Painful swallowing
- Hoarseness
- Nausea and vomiting, especially bloody vomiting
- Diarrhea or bloody diarrhea
- Headache
- Flushing (red face) and red eyes
- Stomach pain
- Fainting
- Swelling of abdomen (stomach)

Injection anthrax symptoms can include:

- Fever and chills
- A group of small blisters or bumps that may itch, appearing where the drug was injected
- A painless skin sore with a black center that appears after the blisters or bumps
- Swelling around the sore
- Abscesses deep under the skin or in the muscle where the drug was injected

To keep in mind

Injection anthrax symptoms are similar to those of cutaneous anthrax, but injection anthrax can spread throughout the body faster and be harder to recognize and treat than cutaneous anthrax. Skin and injection site infections associated with injection drug use are common and do not necessarily mean the person has anthrax.

CDC guidance and case definitions are available to help doctors diagnose anthrax.

Diagnosing anthrax

Doctors in the United States rarely see a patient with anthrax. CDC guidance and case definitions are available to help doctors diagnose anthrax, take patient histories to determine how exposure may have occurred, and order necessary diagnostic tests.

If inhalation anthrax is suspected, chest X-rays or CT scans can confirm if the patient has mediastinal widening or pleural effusion, which are X-ray findings typically seen in patients with inhalation anthrax.

The only ways to confirm an anthrax diagnosis are:

- To measure antibodies or toxin in blood
- To test directly for *Bacillus anthracis* in a sample
 - blood
 - skin lesion swab
 - spinal fluid
 - respiratory secretions

Samples must be taken before the patient begins taking antibiotics for treatment.



Bioterrorism

We do not know if or when another anthrax attack might occur. However, federal agencies have worked for years with health departments across the country to plan and prepare for an anthrax attack. If such an emergency were to occur in the United States, CDC and other federal agencies would work closely with local and state partners to coordinate a response.

Why would anthrax be used as a weapon?

If a bioterrorist attack were to happen, *Bacillus anthracis*, the bacteria that cause anthrax, would be one of the biological agents most likely to be used. Biological agents are germs that can sicken or kill people, livestock, or crops. Anthrax is one of the most likely agents to be used because:

- Anthrax spores are easily found in nature, can be produced in a lab, and can last for a long time in the environment.
- Anthrax makes a good weapon because it can be released quietly and without anyone knowing. The microscopic spores could be put into powders, sprays, food, and water. Because they are so small, you may not be able to see, smell, or taste them.
- Anthrax has been used as a weapon before.

Anthrax has been used as a weapon around the world for nearly a century. In 2001, powdered anthrax spores were deliberately put into letters that were mailed through the U.S. postal system. Twenty-two people, including 12 mail handlers, got anthrax, and five of these 22 people died.

How dangerous is anthrax?

A subset of select agents and toxins have been designated as Tier 1 because these biological agents and toxins present the greatest risk of deliberate misuse with significant potential for mass casualties or devastating effect to the economy, critical infrastructure, or public confidence, and pose a severe threat to public health and safety. *Bacillus anthracis* is a Tier 1 agent.

B. anthracis is a select agent. The possession, use, or transfer of *B. anthracis* is regulated by the Division of Select Agents and Toxins (DSAT), located in CDC's Office of Public Health Preparedness and Response.

What might an anthrax attack look like?

An anthrax attack could take many forms. For example, anthrax spores could be placed in letters and mailed, as was done in 2001, or they could be put into food or water. Anthrax also could be released into the air from a truck, building, or plane. This type of attack would mean the anthrax spores could easily be blown around by the wind or carried on people's clothes, shoes, and other objects. It only takes a small amount of anthrax to infect a large number of people.

If anthrax spores were released into the air, people could breathe them in and get sick with anthrax. Inhalation anthrax is the most serious form and can kill quickly if not treated immediately. If the attack were not detected by one of the monitoring systems in place in the United States, it might go unnoticed until doctors begin to see unusual patterns of illness among sick people showing up at emergency rooms.



For more information, visit www.cdc.gov/info

Or call 1-800-232-4636

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