


UNITED STATES DEPARTMENT OF LABOR
 OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION

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ANTHRAX eTool **Protecting the Worksite against terrorism**

What is anthrax?	Who is at risk?	How do I prepare?	What if I have a threat?	How do I clean up my worksite?
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What is anthrax?

Anthrax is an acute infectious disease caused by a spore-forming bacterium called *Bacillus anthracis*. It is generally acquired following contact with anthrax-infected animals or anthrax-contaminated animal products. Anthrax has received heightened attention recently because of its use as a biological warfare agent.



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What is *Bacillus anthracis*?

- *Bacillus anthracis*, the etiologic agent of anthrax, is a large, gram-positive, non-motile, spore-forming bacterial rod. The three virulence factors of *Bacillus anthracis* are edema toxin, lethal toxin, and a capsular antigen. Human anthrax has three major clinical forms: cutaneous, inhalation, and gastrointestinal.
- *Bacillus anthracis* spores do not have a characteristic appearance such as color, smell, or taste. Spores themselves are too small to be seen by the naked eye, but have been mixed with powder to transport them.



How can I be exposed to *Bacillus anthracis*?

- Anthrax infection can occur in three forms:
 - Cutaneous (skin)
 - Inhalation
 - Gastrointestinal
- *Bacillus anthracis* spores can live in soil for many years. Humans can become infected with anthrax by handling products from infected animals or by inhaling anthrax spores from contaminated animal products.
- Anthrax can also be spread by eating undercooked meat from infected animals. It is rare to find infected animals in the United States.
- Direct person-to-person spread of anthrax is extremely unlikely to occur. Communicability is not a concern in managing or visiting with patients with inhalational anthrax.



What are the symptoms of anthrax?

Symptoms of disease vary depending on how the disease was contracted, but symptoms usually occur within 7 days.

- **Cutaneous:** Most (about 95 percent) anthrax infections occur when the bacterium enters a cut or abrasion on the skin, such as when handling contaminated wool, hides, leather, or hair products (especially goat hair) of infected animals. Skin infection begins as a raised itchy bump that resembles an insect bite but within 1-2 days develops into a vesicle and then a painless ulcer, usually 1-3 centimeters in diameter, with a characteristic black necrotic (dying) area in the center. Lymph glands in the adjacent area may swell. About 20 percent of untreated cases of cutaneous anthrax will result in death. Deaths are rare with appropriate antimicrobial therapy.
- **Inhalation:** Initial symptoms may resemble a common cold. After several days, the symptoms may progress to severe breathing problems and shock. Inhalation anthrax is often fatal.
- **Intestinal:** The intestinal disease form of anthrax may follow the consumption of contaminated meat and is characterized by an acute inflammation of the intestinal tract. Initial signs of nausea, loss of appetite, vomiting, and fever are followed by abdominal pain, vomiting of blood, and severe diarrhea. Intestinal anthrax results in death in 25 percent to 60 percent of cases. [Source: [CDC Anthrax FAQ](#)]

What are the incidence rates of anthrax?

As of December 5, 2001, a total of 22 cases of anthrax have been identified in the United States -- 11 were confirmed as inhalational anthrax and 11 (seven confirmed and four suspected) were cutaneous. Of the 11 cases of inhalational anthrax, direct exposure to *Bacillus anthracis*-containing envelopes was confirmed or likely in the first nine cases.

Before 2001, the incidence rates of anthrax were:

- From January 1955 to December 1999, there were 236 reported cases of anthrax, most of them cutaneous, in 30 states and the District of Columbia.
- The last case of inhalational anthrax in the United States, before 2001, was in 1976 in California. A home craftsman died of the disease. He was exposed through his work with yarn; *Bacillus anthracis* was isolated from some of the imported yarns used by the patient.
- The last case of cutaneous anthrax, before 2001, occurred in North Dakota, in 2000. It was the only case since 1992.

The case fatality rates for the various forms of anthrax are:

- **Cutaneous:** Early treatment of cutaneous anthrax is usually curative, and early treatment of all forms is important for recovery. Patients with cutaneous anthrax have reported case fatality rates of 20 percent without antibiotic treatment and less than 1 percent with it.
- **Inhalational:** Although case-fatality estimates for inhalational anthrax are based on incomplete information, the rate is extremely high, approximately 75 percent, even with all possible supportive care including appropriate antibiotics. Estimates of the impact of the delay in post-exposure prophylaxis or treatment on survival are not known.
- **Gastrointestinal:** For gastrointestinal anthrax, the case-fatality rate is estimated to be 25 percent to 60 percent. The effect of early antibiotic treatment on the case-fatality rate is not defined.

How is anthrax diagnosed and treated?

Diagnosis: Anthrax is diagnosed by isolating *Bacillus anthracis* from the blood, skin lesions, or respiratory secretions or by measuring specific antibodies in the blood of persons with suspected cases.



Treatment: Doctors can prescribe effective antibiotics. *Bacillus anthracis* usually responds effectively to several antibiotics including penicillin, doxycycline, and fluoroquinolones (such as ciprofloxacin). To be effective, treatment should be initiated early. If left untreated, the disease can be fatal.

Further information on antimicrobial treatment of anthrax can be found on the following websites:

- [Update: Investigation of Bioterrorism-Related Anthrax and Interim Guidelines for Exposure Management and Antimicrobial Therapy](#). Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), 50(42);909-919, (2001, October 26).
- [Frequently Asked Questions \(FAQs\) About Anthrax](#). Centers for Disease Control and Prevention (CDC), Public Health Emergency Preparedness & Response.

Is there a way to prevent infection?

In countries where anthrax is common and vaccination levels of animal herds are low, humans should avoid contact with livestock and animal products and avoid eating meat that has not been properly slaughtered and cooked. Also, an anthrax vaccine has been licensed for use in humans. The vaccine is reported to be 93 percent effective in protecting against anthrax.



The anthrax vaccine is a cell-free filtrate vaccine, which means it contains no dead or live bacteria in the preparation. The final product contains no more than 2.4 milligrams of aluminum hydroxide as an additive. Anthrax vaccines intended for animals should not be used in humans.

The *Advisory Committee on Immunization Practices* [[PDF](#) - 226 KB] has recommend anthrax vaccination for the following groups:

- People who work directly with the organism in the laboratory,
- People who work with imported animal hides or furs in areas where standards are insufficient to prevent exposure to anthrax spores,
- People who handle potentially infected animal products in high-incidence areas (Incidence is low in the United States, but veterinarians who travel to work in other countries where incidence is higher should consider being vaccinated.), and
- Military personnel deployed to areas with high risk for exposure to the organism (as when it is used as a biological warfare weapon).
- First responders and workers involved in anthrax decontamination.

Pregnant women should be vaccinated only if absolutely necessary.

Further information on anthrax vaccination can be found on the following websites:

- The anthrax [Vaccine Immunization Program](#) in the U.S. Army Surgeon General's Office can be reached at (877)GETVACC (877)438-8222.

- *Use of Anthrax Vaccine in the United States*. Centers for Disease Control (CDC), Morbidity and Mortality Weekly Report (MMWR), 49;RR-15, (2000, December 15), 226 KB [PDF](#).

Links to additional information on *Bacillus anthracis* and anthrax

- [Frequently Asked Questions \(FAQs\) About Anthrax](#). Centers for Disease Control and Prevention (CDC), Public Health Emergency Preparedness & Response.
- [Disease Information: Anthrax](#). Centers for Disease Control and Prevention (CDC), Division of Bacterial and Mycotic Diseases.
- [Update: Investigation of Bioterrorism-Related Anthrax and Interim Guidelines for Exposure Management and Antimicrobial Therapy](#). Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), 50(42):909-919, (2001, October 26).
- [The anthrax Vaccine Immunization Program](#). U.S. Army Surgeon General's Office.

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