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Opinion Article

A Detailed View on Anthrax Disease

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ABOUT THE STUDY

Bacillus anthracis causes anthrax, a bacterial illness. It can reveal itself in four ways: on the skin, in the lungs, in the intestines and as an injection. Symptoms might appear anywhere from one day to more than two months after the virus is contracted. A small blister with surrounding swelling appears on the skin which commonly develops into a painless ulcer with a black centre. Fever, chest pain and shortness of breath are symptoms of the inhalation variant. The intestinal phase is characterized by bloody diarrhoea, abdominal discomfort, and nausea and vomiting. The injectable form is indicated by a fever and an abscess at the injection site. The first clinical descriptions of cutaneous anthrax were given by Maret in 1752 and Fournier in 1769 according to the Centers for Disease Control. Only historical accounts have previously been used to characterise anthrax. Robert Koch (1843–1910), a Prussian chemist was the first to identify *Bacillus anthracis* as the bacteria that causes anthrax. Contact with the bacterium's spores which are frequently found in pathogenic animal products is how anthrax is spread. Contact is made through breathing, eating or a damaged skin region. People who work with animals or animal products, travellers and military personnel are all at risk. Antibodies or toxin can be found in the blood or a sample from the infected site can be cultured to confirm the diagnosis.

Anthrax on the skin also known as hide-illness and is referred to as cutaneous anthrax. It is the most frequent type of anthrax (>90 percent of cases). It is the least hazardous type (low mortality with treatment, 23.7 percent mortality without). Cutaneous anthrax appears as a boil-like skin lesion that develops into a black-centered ulcer. At the infection site, the black eschar generally manifests as a big, painless necrotic ulcer (which begins as an unpleasant and itchy skin lesion or blister that is dark and usually concentrated as a black dot resembling bread mould). The symptoms of inhalation anthrax normally appear within a week of exposure although it can take up to two months. The majority of patients experience fever, chills and exhaustion during the first few days of sickness. Cough, shortness of breath, chest pain, nausea and vomiting may accompany these symptoms making inhalation anthrax difficult to identify from influenza and community-acquired pneumonia. The prodromal phase is a term used to characterize this era. Shortness of breath, cough and chest discomfort grow increasingly common during the next day and non-chest problems such nausea, vomiting, altered mental status, sweating and headache arise in one-third or more of the population. Upper respiratory symptoms affect only about a quarter of the population and muscle problems are uncommon. The fulminant phase of sickness is marked by changes in mental state or shortness of breath, which usually prompts people to seek medical help.

For the direct identification of *B. anthracis* in clinical material, a variety of approaches can be applied. To begin, Gram staining of specimens is one option. *Bacillus* spp. grows to be quite large (3 m to 4 m long) can form lengthy chains and stain Gram-positive. Rapid diagnostic techniques such as polymerase chain reaction-based assays and immunofluorescence microscopy may be employed to confirm the bacterium is *B. anthracis*.

On 5 percent sheep blood agar and other common culture media, all *Bacillus* species grow well. *B. anthracis* can be isolated from contaminated specimens using polymyxin-lysozyme-EDTA-thallous acetate and bicarbonate agar is employed as an identification procedure to stimulate capsule formation. *Bacillus* spp. typically develops within 24 hours of incubation at 35°C in room temperature air, or in 5% CO_2. When using bicarbonate agar for identification, the medium must be incubated in 5% CO_2. On 5 percent sheep blood agar, *B. anthracis* colonies are medium-sized, grey, flat and irregular with swirling projections giving them a "medusa head" look. They are not hemolytic. On egg yolk agar, the bacteria are not motile are vulnerable to penicillin and create a large zone of lecithinase. Gamma bacteriophage testing, indirect hemagglutination and an enzyme-linked immunosorbent assay to detect antibodies are examples of confirmatory testing for *B. anthracis*. The Ascoli test is the best confirmatory precipitation test for anthrax.

To avoid contact with the skin and any fluids secreted through natural body openings of a deceased person suspected of

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containing anthrax, precautions are taken. The body should be kept in a secure environment. To determine if anthrax is the cause of death, a blood sample is obtained, sealed in a container and examined in an accredited laboratory. To avoid the spread of anthrax spores, the body should be packed in an airtight body bag and burned.

Except in the uncommon event of skin exudates from cutaneous anthrax, anthrax cannot be transferred from person to person. However, anthrax spores can contaminate a person's clothing and body. A thorough wash-down with antibacterial soap and water is an effective way to decontaminate people. Bleach or another antimicrobial agent is used to treat wastewater. Boiling goods in water for 30 minutes or longer is an effective way to decontaminate them.

Anthrax must be treated with antibiotics as soon as possible; waiting too long reduces the odds of survival. Large dosages of intravenous and oral antibiotics, such as fluoroquinolones (ciprofloxacin), doxycycline, erythromycin, vancomycin or penicillin are used to treat anthrax and other bacterial infections. Ciprofloxacin, doxycycline and penicillin are all FDA-approved antibiotics. Early antibiotic prophylactic treatment is critical in suspected cases of pulmonary anthrax to avoid death. Many attempts have been made to produce new anti-anthrax medications although existing drugs are effective if treated promptly.