**CDC.gov Anthrax Case Definition (2018)**

**Background**

Anthrax has been a notifiable condition since 19441 and has historically been caused by the organism *B. anthracis*. Although *B. anthracis* is a select agent and thus falls under the reporting requirements of both the National Select Agent Program2 and the Laboratory Response Network (LRN), CDC also conducts case surveillance. Surveillance is an important aspect of case detection, and disease-specific information informs what and how additional case finding should occur.

**Clinical Description**

An illness or post-mortem examination characterized into several distinct clinical types, including:

**Cutaneous anthrax**: It usually begins as a small, painless, pruritic papule on an exposed surface, which progresses through a vesicular stage into a depressed black eschar; the eschar is often surrounded by edema or erythema and may be accompanied by lymphadenopathy. Fever is also common.

**Ingestion anthrax**: presents as two sub-types:

Oropharyngeal: When anthrax spores germinate in the oropharynx, a mucosal lesion may be observed in the oral cavity or oropharynx. Symptoms include sore throat, difficulty swallowing, and swelling of the neck. Less specific symptoms include fever, fatigue, shortness of breath, abdominal pain, and nausea/vomiting; the symptoms may resemble a viral respiratory illness. Cervical lymphadenopathy, ascites, and altered mental status may be observed.

Gastrointestinal: When anthrax spores germinate in the lower gastrointestinal tract, symptoms include abdominal pain, nausea, vomiting or diarrhea (either of which may contain blood), and abdominal swelling. Less specific symptoms such as fever, fatigue, and headache are also common. Altered mental status and ascites may be observed.

**Inhalation anthrax**: Often described as a biphasic illness. Early nonspecific symptoms of inhalation anthrax include fever and fatigue. Localized thoracic symptoms such as cough, chest pain, and shortness of breath follow, as may non-thoracic symptoms such as nausea, vomiting, abdominal pain, headache, diaphoresis, and altered mental status. Lung sounds are often abnormal and imaging often shows pleural effusion or mediastinal widening.

**Injection anthrax**: Usually presents as a severe soft tissue infection manifested as significant edema or bruising after an injection. No eschar is apparent, and pain is often not described. Nonspecific symptoms such as fever, shortness of breath, or nausea are sometimes the first indication of illness. Occasionally patients present with meningeal or abdominal involvement. A coagulopathy is not unusual.

Additional considerations:

1. Signs of systemic involvement from the dissemination of either the bacteria and / or its toxins can occur with all types of anthrax and include fever or hypothermia, tachycardia, tachypnea, hypotension, and leukocytosis. One or more of these signs are usually present in patients with ingestion anthrax, inhalation anthrax, and injection anthrax and may be present in up to a third of patients with cutaneous anthrax.
2. Anthrax meningitis: may complicate any form of anthrax, and may also be a primary manifestation. Primary symptoms include fever, headache (which is often described as severe), nausea, vomiting, and fatigue. Meningeal signs (e.g., meningismus), altered mental status, and other neurological signs such as seizures or focal signs are usually present. Most patients with anthrax meningitis have cerebral spinal fluid (CSF) abnormalities consistent with bacterial meningitis, and the CSF is often described as hemorrhagic.

**Clinical Criteria**

* For surveillance purposes, an illness with at least one specific **OR** two non-specific symptoms and signs that are compatible with cutaneous, ingestion, inhalation, or injection anthrax; systemic involvement; or anthrax meningitis3;**OR**
* A death of unknown cause **AND** organ involvement consistent with anthrax4.

**Laboratory Criteria for Diagnosis**

Presumptive laboratory criteria for *Bacillus anthracis* or *Bacillus cereus* expressing anthrax toxins:

* Gram stain demonstrating Gram-positive rods, square-ended, in pairs or short chains;
* Positive result on a test with established performance in a CLIA-accredited laboratory1;

Confirmatory laboratory criteria for *Bacillus anthracis* or *Bacillus cereus* expressing anthrax toxins:

* Culture and identification from clinical specimens by Laboratory Response Network (LRN)5,6;
* Demonstration of *B. anthracis* antigens in tissues by immunohistochemical staining using both *B. anthracis* cell wall and capsule monoclonal antibodies;
* Evidence of a four-fold rise in antibodies to protective antigen between acute and convalescent sera or a fourfold change in antibodies to protective antigen in paired convalescent sera using Centers for Disease Control and Prevention (CDC) quantitative anti-PA immunoglobulin G (IgG) ELISA testing in an unvaccinated person;
* Detection of *B. anthracis* or anthrax toxin genes by the LRN-validated polymerase chain reaction and/ or sequencing in clinical specimens collected from a normally sterile site (such as blood or CSF) or lesion of other affected tissue (skin, pulmonary, reticuloendothelial, or gastrointestinal);
* Detection of lethal factor (LF) in clinical serum specimens by LF mass spectrometry.

**Epidemiologic Linkage**

* Exposure to environment, food, animal, materials, or objects that is suspect or confirmed to be contaminated with *B. anthracis*;
* Exposure to the same environment, food, animal, materials, or objects as another person who has laboratory-confirmed anthrax;
* Consumption of the same food as another person who has laboratory-confirmed anthrax.

**Criteria to Distinguish a New Case from an Existing Case**

* Case not previously reported to public health authorities.

**Case Classification**

**Suspected**

* A case that meets the clinical criteria **AND** for whom an anthrax test was ordered, but with no epidemiologic evidence relating it to anthrax.

**Probable**

* A case that meets the clinical criteria **AND** has presumptive laboratory test results, **OR**
* A case that meets the clinical criteria **AND** has an epidemiologic evidence relating it to anthrax.

**Confirmed**

* A case that meets the clinical criteria **AND** has confirmatory laboratory test results.

**Reference(s)**

1. Centers for Disease Control and Prevention. Anthrax Nationally Notifiable Time Periods. <https://wwwn.cdc.gov/nndss/conditions/anthrax/>. Accessed January 17, 2017.
2. Federal Select Agent Program. Select Agents and Toxins List. 2014; <https://www.selectagents.gov/SelectAgentsandToxinsList.html>. Accessed January 17, 2017.
3. Council of State and Territorial Epidemiologists. Revision for the Standardized Case Definition, Case Classification, and National Surveillance for Anthrax. Atlanta, GA: Council of State and Territorial Epidemiologists; 2017. <http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/2017PS/2017PSFinal/17-ID-02.pdf>.
4. Abramova FA, Grinberg LM, Yampolskaya OV, Walker DH. Pathology of inhalational anthrax in 42 cases from the Sverdlovsk outbreak of 1979. Proc Natl Acad Sci U S A. 1993;90(6):2291-2294.
5. CDC, ASM, APHL. Sentinel Level Clinical Microbiology Laboratory Guidelines for Suspected Agents of Bioterrorism and Emerging Infectious Diseases: Bacillus Anthracis. 2010; <http://www.asm.org/images/pdf/Clinical/Protocols/anthrax.pdf>. Accessed January 27, 2017.
6. APHL. APHL and ASM Interim Guidance: Addition of Bacillus cereus biovar anthracis as a Tier 1 Select Agent. 2016; <https://www.aphl.org/programs/preparedness/Documents/B-cereus-biovar-anthracis_Interim-Guidance.pdf>. Accessed January 27, 2017.