

Clinical Anthrax

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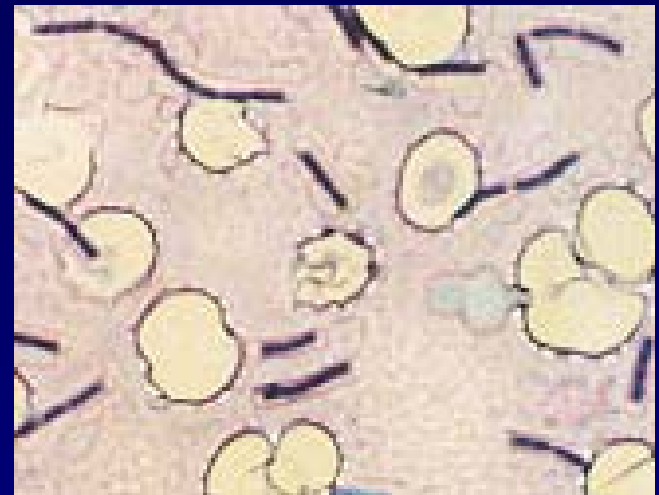
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Anthrax: Basics

- Caused by the spore-forming bacterium, *Bacillus anthracis*
- Zoonotic disease in herbivores (e.g., sheep, goats, cattle), follows ingestion of spores in soil
- Human infection acquired through contact with anthrax-infected animals or animal products or through intentional exposure
- Three clinical forms
 - Cutaneous
 - Inhalational
 - Gastrointestinal

Anthrax: Etiology

- *B. anthracis*
 - Gram positive, spore forming, non-motile bacillus



Anthrax: Clinical Forms

Cutaneous:

- Begins as a papule, progresses through a vesicular stage, to a depressed black necrotic ulcer (eschar)
- Edema, redness, and/or necrosis without ulceration may occur
- Form most commonly encountered in naturally occurring cases

Anthrax: Clinical Forms

Inhalational:

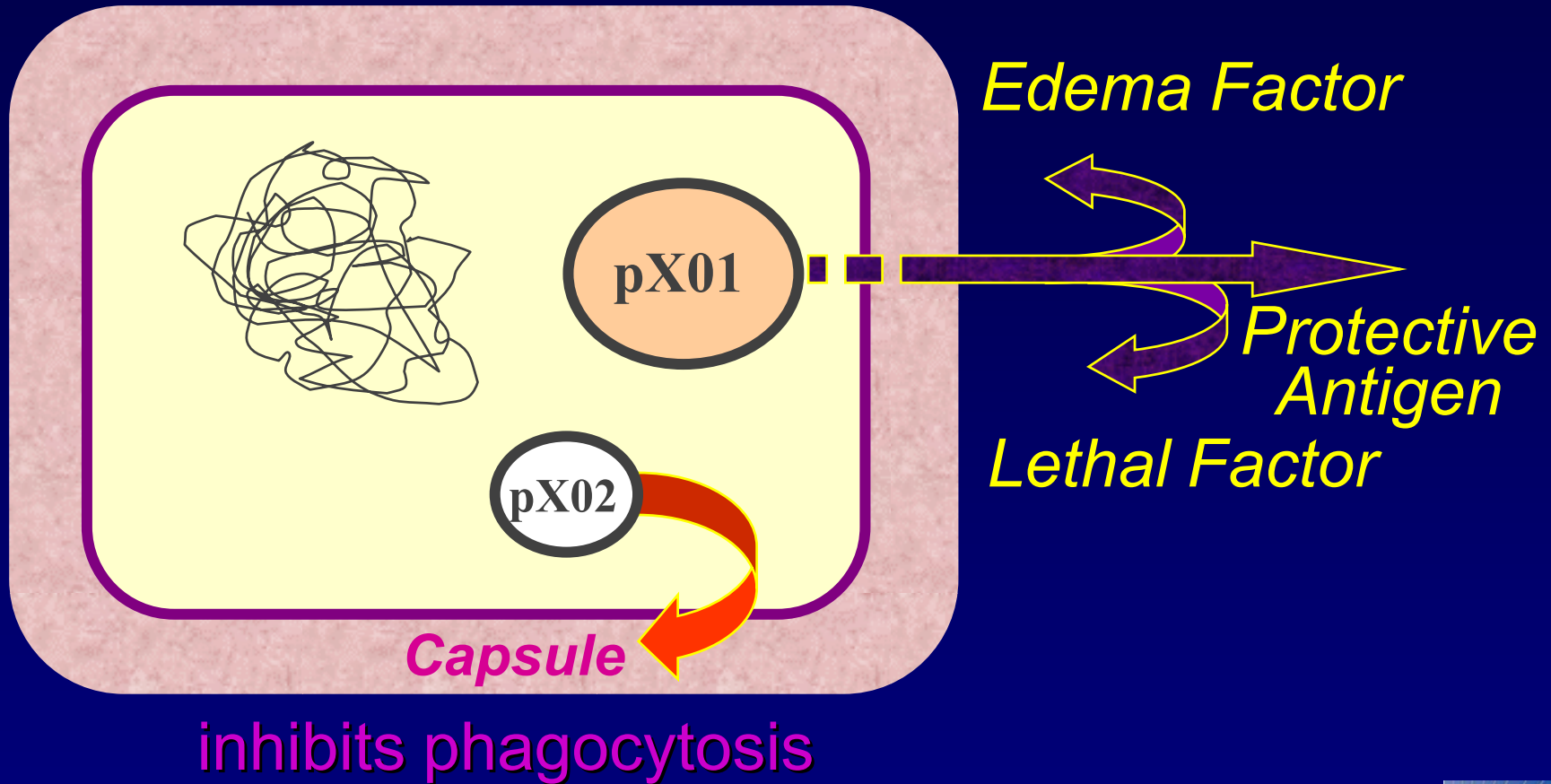
- A brief prodrome resembling a “viral-like” illness, characterized by myalgia, fatigue, fever, with or without respiratory symptoms, followed by hypoxia and dyspnea, often with radiographic evidence of mediastinal widening.
- Meningitis in 50% of patients
- Extremely rare in U.S. (20 reported cases in last century)

Anthrax: Clinical Forms

Gastrointestinal:

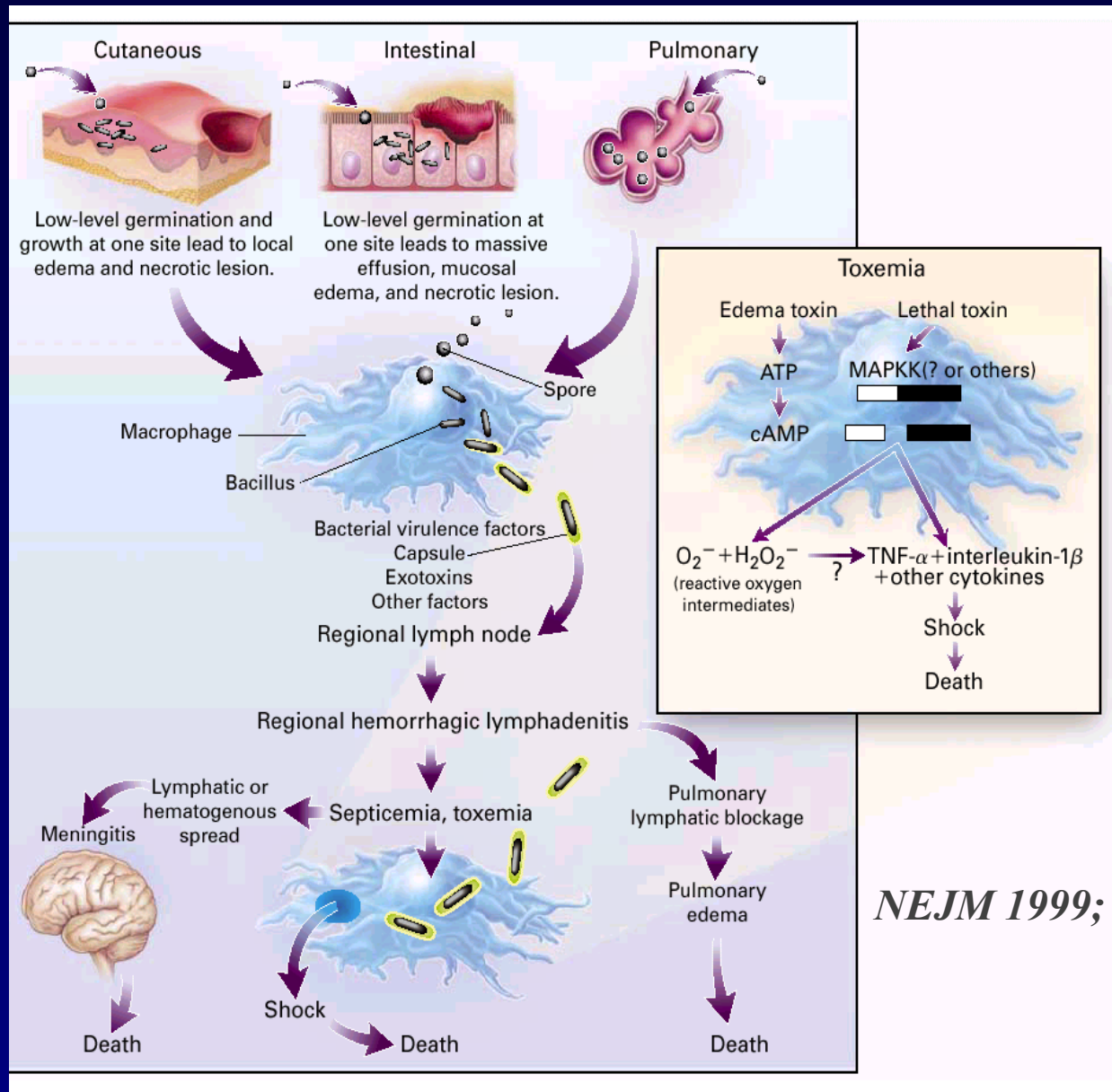
- Abdominal distress, usually accompanied by bloody vomiting or diarrhea, followed by fever and signs of septicemia
- Gastrointestinal illness sometimes seen as oropharyngeal ulcerations with cervical adenopathy and fever
- Develops after ingestion of contaminated, poorly cooked meat.

Bacillus anthracis: Virulence Factors



Pathogenesis of Anthrax

Spores



Anthrax: Cutaneous

Vesicle
development
Day 2



Day 4



Day 6



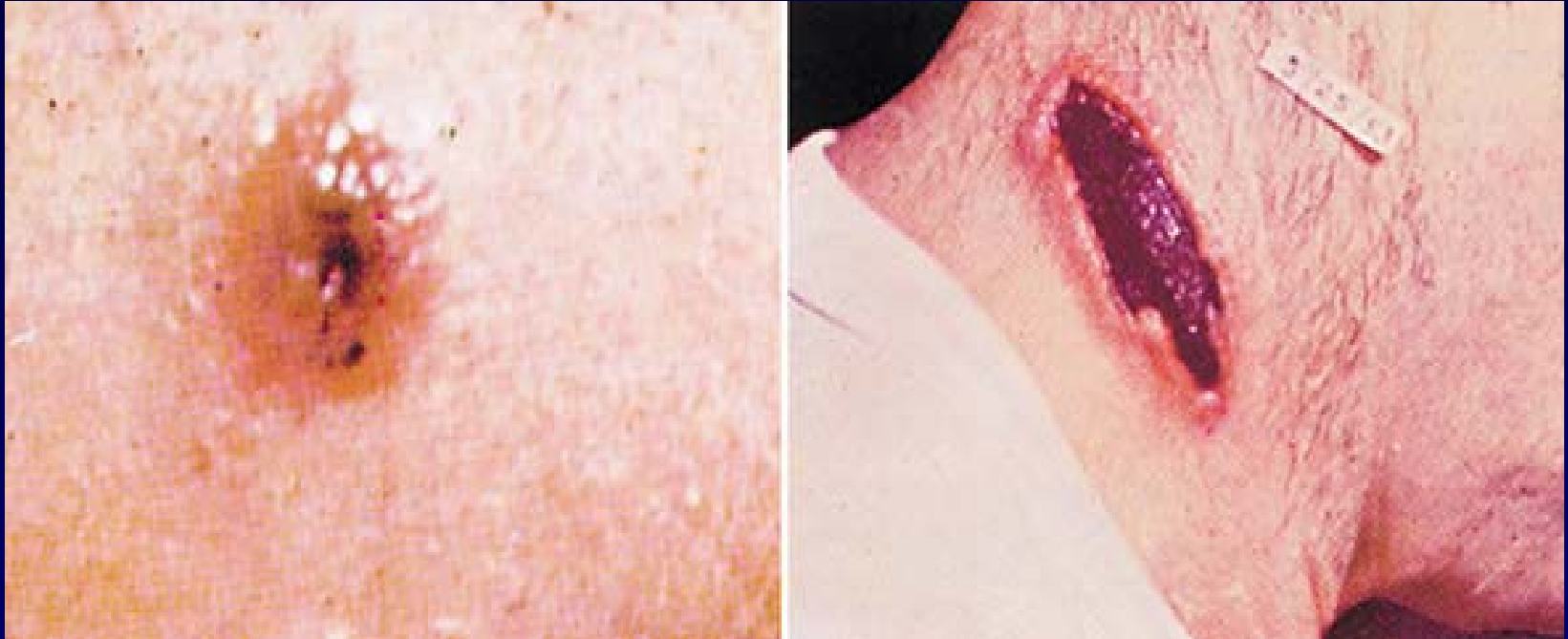
Day 10



Eschar
formation



Anthrax: Cutaneous



Left, **Forearm lesion on day 7** - vesiculation and ulceration of initial macular or papular anthrax skin lesion. Right, **Eschar of the neck on day 15** of illness, typical of the last stage of the lesion. From Binford CH, Connor DH, eds. *Pathology of Tropical and Extraordinary Diseases*. Vol 1. Washington, DC: AFIP; 1976:119. AFIP negative 71-1290-2.

Anthrax: Cutaneous

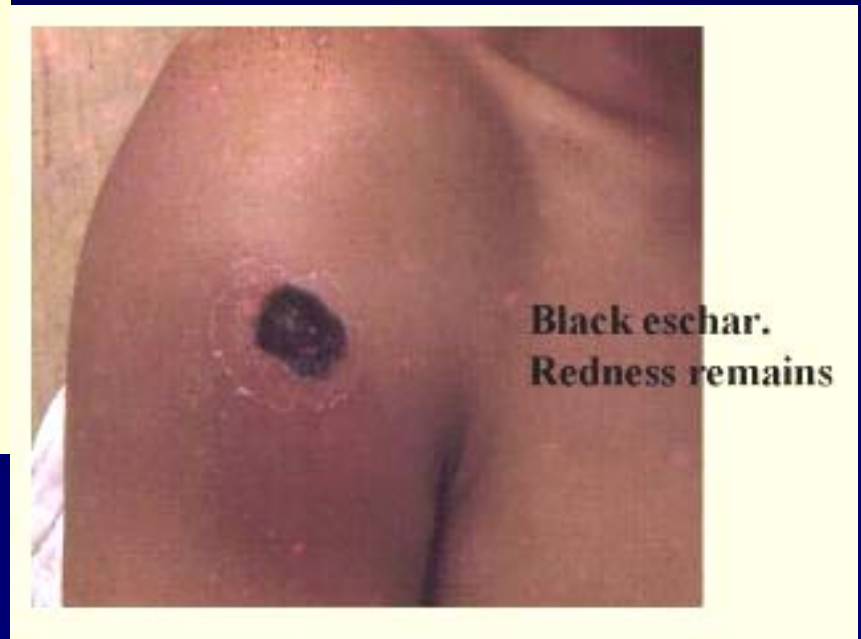


NEJM 1999; 341: 815- 826

Anthrax: Cutaneous



Anthrax: Cutaneous



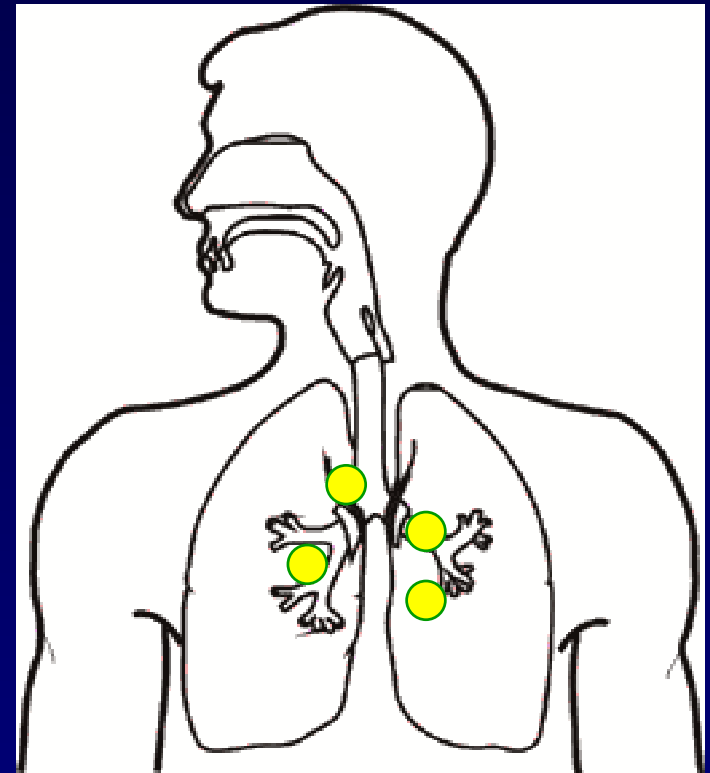
Anthrax: Cutaneous



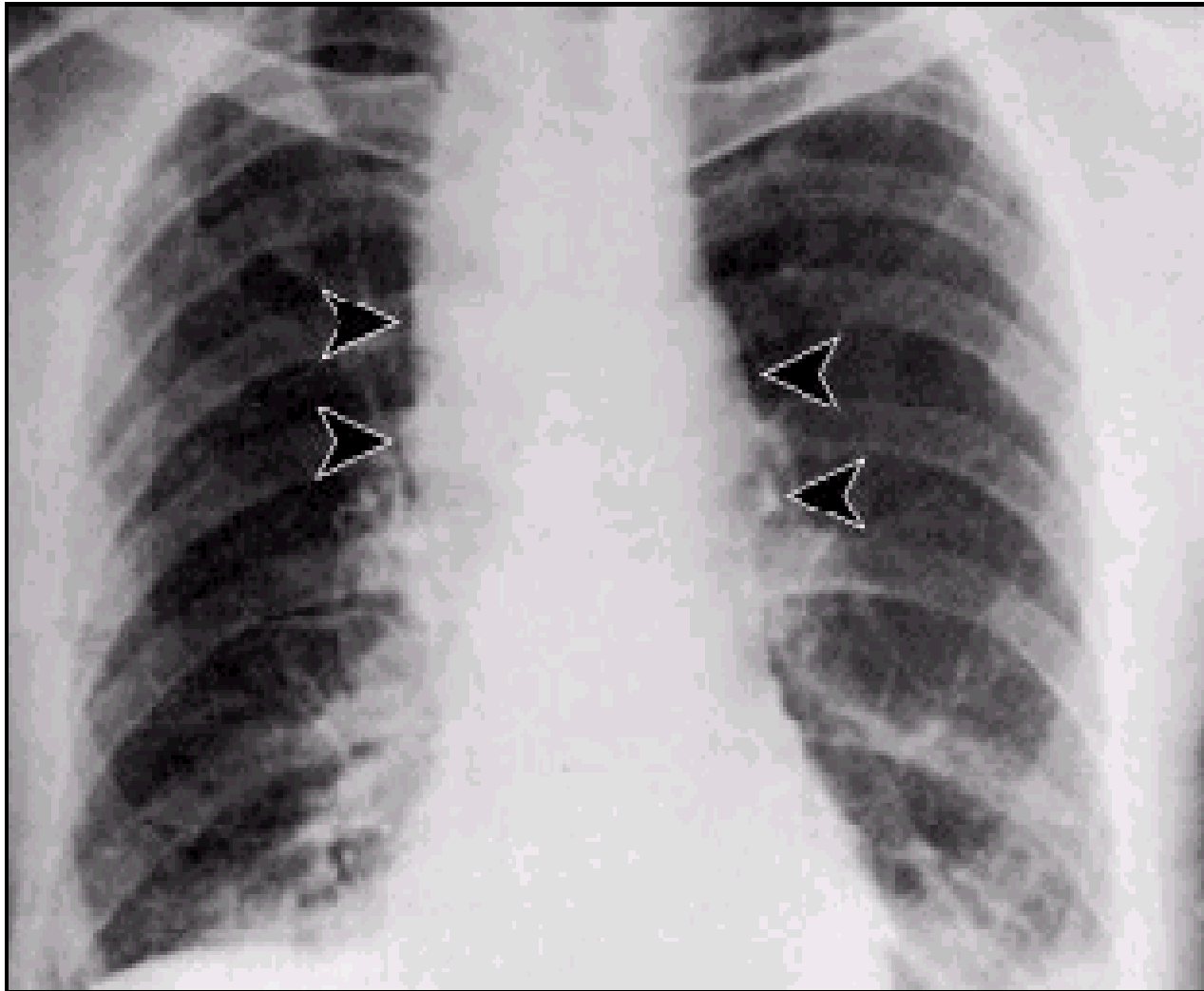
Notice the edema and typical lesions

Inhalational Anthrax

- Inhalation of spores
- Incubation, 2-3 days (range up to 60 days)
- Spores engulfed by macrophages and transported to mediastinal and peribronchial lymph nodes
- Insidious onset: malaise, low grade fever, nonproductive cough
- Abrupt development of respiratory distress
- Hemorrhagic mediastinitis
- Hematogenous spread
- Meningitis in 50%, usually fatal



Anthrax: Inhalational



JAMA 1999;281:1735-1745

Mediastinal Widening and Pleural Effusion on Chest X-Ray in Inhalational Anthrax



Differential Diagnosis of Cutaneous Anthrax

- Spider bite
- Ecthyma gangrenosum
- Ulceroglandular tularemia
- Plague
- Staphylococcal or streptococcal cellulitis

Differential Diagnosis of Inhalational Anthrax

- Mycoplasmal pneumonia
- Legionnaires' disease
- Psittacosis
- Tularemia
- Q fever
- Viral pneumonia
- Histoplasmosis (fibrous mediastinitis)
- Coccidioidomycosis

Anthrax: Diagnosis

Cutaneous:

- Eschar
- Culture of vesicular fluid or exudate
- Blood culture
- Biopsy
- PCR
- Immunofluorescence and immunohistochemistry

Anthrax: Diagnosis

Inhalational:

- CXR - widened mediastinum, pleural effusions
- Blood or CSF culture and Gram stain
- PCR
- Immunofluorescence and immunohistochemistry

Anthrax: Reminders

- Individuals must be exposed to *B. Anthracis* spores.
- To cause disease, *B. anthracis* spores must enter the skin, be swallowed, or inhaled.
- Disease can be prevented after exposure to anthrax spores by early treatment with appropriate antibiotics
- Anthrax is NOT spread from person to person