

# Anthrax

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## Learning Objectives

- Describe the microbial and immunologic characteristics of anthrax
- Describe common adverse events associated with administration of the anthrax vaccine

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## Anthrax

- 2001 - first intentional release of anthrax in U.S.
  - 22 cases of anthrax bioterrorism attacks
    - 11 inhalation
    - 11 cutaneous
- 1976 - last inhalation anthrax case in U.S. prior to 2001

Centers for Disease Control and Prevention. Epidemiology and Prevention of Toxic-Preventable Diseases. Atlanta: W. Hamesbury & McGraw-Hill, eds. 9th ed. Washington DC: Public Health Foundation, 2006.

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## Anthrax Spore as a Biological Weapon

- Characteristics
  - Stability
    - Resistance to heat, UV light, gamma radiation, drying, disinfectants
  - Particle size
    - 1-2  $\mu\text{m}$  diameter
  - Mortality
    - High with inhalation anthrax

Centers for Disease Control and Prevention. Epidemiology and Prevention of Toxic-Preventable Diseases. Ashman W, Hamberky J, McInerney L, Wolfe S, eds. 9th ed. Washington DC: Public Health Foundation, 2006.

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## Bacillus Anthracis

- Aerobic, spore-forming
- Gram positive
- Found in soil
- Spores remain viable for years



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## Pathogenesis / Transmission

- Spores enter through broken skin or mucous membranes
- Germinate in macrophages
- Replicate in lymph nodes
- Production of toxins cause damage to tissues and organs

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## Pathogenesis

- 3 clinical forms
  - Cutaneous
  - Ingestion
  - Inhalation

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Adkinson W, Hanthberky J, McIntyre L, Wolfe S, eds. 9th ed. Washington DC: Public Health Foundation, 2006.

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## Gastrointestinal Anthrax

- Ingestion of contaminated meat
- Incubation period: 1-7 days
- Characterized by oropharyngeal lesions, fever, abdominal pain, constipation, diarrhea, bloody stools, hematemesis, ascites
- Case fatality 25-60%

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Adkinson W, Hanthberky J, McIntyre L, Wolfe S, eds. 9th ed. Washington DC: Public Health Foundation, 2006.

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## Cutaneous Anthrax

- Incubation period: 0.5-12 days
- Painless, pruritic papule changing into necrotic ulcer with black center
- Self-limiting
- Case fatality 5-20%



<http://phd.cdc.gov>

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Adkinson W, Hanthberky J, McIntyre L, Wolfe S, eds. 9th ed. Washington DC: Public Health Foundation, 2006.

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## Inhalation Anthrax

- Suspected to be most common presentation post intentional release
- Incubation period: 1-7 days; up to 43 days
- Clinical presentation: influenza-like symptoms followed by pleural effusion, widened mediastinum, cyanosis, shock
- Case fatality 85-97% (w/antibiotic 75%)
  - 2001 case fatality 45%

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Adkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. 9th ed. Washington DC: Public Health Foundation, 2006.

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## Complications

- Anthrax meningitis
  - All 3 types of anthrax
  - Rare
- Malignant edema
  - Cutaneous anthrax
  - Rare

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## Anthrax Vaccine

- Anthrax vaccine adsorbed
  - Aluminum hydroxide
- Contains cellular and toxin components
- FDA approved for pre-exposure prophylaxis

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## Indications

- Pre-exposure
  - Work involving production of high quantities of B. anthracis
  - Work involves elevated risk for aerosol production
  - Work involves increased risk of exposure due to intentional release

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## Indications

- Post-exposure
  - Vaccine alone may not be protective
  - Administer with antibiotic

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## Immunization Schedule

- Primary vaccination
  - SC injection at 0, 2, and 4 weeks
  - SC injection at 6, 12, and 18 months
  - Yearly booster

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### Adverse Effects

- Local reactions
- Systemic reactions
- No documented association between vaccine and development of chronic diseases

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### Contraindications / Precautions

- Allergic reaction to vaccine or components
- Moderate / severe acute illness
- Recovered from anthrax
- Pregnancy
- Immunosuppressed persons

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### Storage and Handling

- Store at 35°-46°F (2°-8°C)
- Do not freeze

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Adult Immunization Training  
Anthrax

Click here to take the post-test  
<http://www.neu.ceedutest.com>

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