Bacillus anthracis – RG3 strains (AMES)

Basic agent information

Section I- Infectious Agent
Risk Group:
- RG3
Synonym or Cross reference:
- Anthrax, Woolsorters’ disease
Characteristics:
- Select agent, aerobic, large Gram-positive rods occurring in chains; non-motile; forms resistant spores

Section II- Dissemination
Reservoir:
- Spores are resistant to adverse environmental conditions and remain viable for years in soil, dried or processed hides
Zoonosis:
- Yes - disease spreads among grazing animals through contaminated soil and feed and among omnivorous and carnivorous animals through contaminated meat, bone meal or other feed; vultures have been reported to spread the organism from one area to another
Vectors:
- Infection of skin may possibly occur through biting flies that had fed on infected animals

Research use considerations

Section III- Laboratory Hazards
Laboratory-Acquired Infections:
- 45 cases with 5 deaths occurring primarily in facilities conducting anthrax research; 25 reported cases of cutaneous anthrax among armed forces personnel
Sources/Specimens:
- Blood, skin lesion exudates, and rarely in urine and feces; hides, hair, wool, bone and bone products, and tissues from infected animals
Primary hazards:
- Direct and indirect contact of skin with cultures and contaminated laboratory surfaces; accidental parenteral inoculation; exposure to infectious aerosols
Special Hazards:
- Naturally and experimentally infected animals pose a risk to laboratory and animal care personnel
Section IV- Stability and Viability

Susceptibility to Disinfectants:
- Spores are resistant to many disinfectants; susceptible to 10% bleach, 2% glutaraldehyde or formaldehyde and 5% formalin (overnight soak preferable)

Physical Inactivation:
- Spores are highly resistant to drying, heat, and sunlight; adequate sterilization requires direct exposure to 121°C for at least 30 min

Survival Outside Host:
- Spores remain viable in soil, skins and hides of infected animals and contaminated air and wool for decades; survival in milk - 10 years; dried on filter paper - 41 years; dried on silk threads - up to 71 years; pond water - 2 years

Section V- Recommended Precautions

Containment Requirements:
- Biosafety level 3 practices and facilities

Protective Clothing:
- Use of adequate protective clothing (gloves, gowns with tight wrists and ties in back) and facilities for washing and changing clothes after work

Other Precautions:
- Care of skin abrasions and proper handling of potentially contaminated articles is essential

Health and Medical

Section VI- Health Hazard

Pathogenicity:
- Cutaneous anthrax - skin lesion becoming papular, then vesiculated and developing into a depressed eschar (5-20% case fatality in untreated cases)
- Inhalation anthrax - respiratory distress, fever and shock with death shortly thereafter
- Intestinal anthrax - abdominal distress followed by fever, septicemia and death (rare); oropharyngeal form described

Epidemiology:
- Infrequent and sporadic in most industrial countries; occupational hazard of workers who process hides, hair, wool, bone and bone products; of laboratory workers and of veterinarians and agricultural workers who handle infected animals; endemic in agricultural regions where anthrax in animals is common (Africa, Asia and Middle East)

Host Range:
- Humans, cattle, sheep, goats, horses, pigs

Infectious Dose:
- 8,000 to 50,000 organisms by inhalation

Natural Mode of Transmission:
- Infection of skin by contact with infected animal tissues and possible by biting flies feeding on such animals, or by contaminated hair, wool, hides or products made from them; inhalation anthrax results from inhalation of spores in contaminated soil areas, dried or processed skins and hides of infected animals; intestinal anthrax from ingestion of contaminated under-cooked meat

**Incubation Period:**
- Within 7 days of exposure, usually 2 to 5 days

**Communicability:**
- Transmission from person to person is very rare

### Section VII- Medical

**Surveillance:**
- Monitor for suspicious skin lesions and other symptoms; laboratory confirmation through direct microscopy, culture, immunological techniques

**Immunization:**
- Vaccine available through the Centers for Disease Control and Prevention and is recommended for those workers with frequent exposure to clinical specimens and cultures; vaccination of cattle or other livestock may be justified in anthrax-endemic areas

**Drug Susceptibility:**
- Susceptible to penicillin (except for inhalation anthrax in which the mortality remains high); ciprofloxacin, doxycycline, tetracycline, erythromycin, chloramphenicol

**Prophylaxis:**
- Antibiotic treatment (oral ciprofloxacin or doxycycline)

**Clinical Monitoring, including fever watch:**
- Anthrax Fever Watch Protocol: Any person working with anthrax, regardless of vaccination status, who develops fever of 101.5 F or higher, with or without respiratory complaint, should report to the University Occupational Health and Safety (UCOM) or the ER
- Respiratory symptoms may include shortness of breath, cough, and chest pain, but these symptoms are not necessary for evaluation
- Other symptoms such as headache, chills, weakness, and abdominal pain will also be noted, but are not necessary for evaluation for inhalational Anthrax
- Additionally, patients with a fever of at least 101.5 F accompanied by a cutaneous ulcer with or without an eschar will need evaluation for possible cutaneous anthrax, and patients with oropharyngeal ulcers, nausea, vomiting, diarrhea, or abdominal pain will be evaluated for gastrointestinal anthrax
- The employee should declare that they work with anthrax in a research lab. A focused history and physical will be performed. If there is a fever of greater than 101.5 F, antibiotic therapy will be initiated

**Treatment:**

**Diagnostic Testing:** The Microbiology Laboratory should be notified that the worker is being evaluated for anthrax. Testing for all patients will include:

- Chest X-ray
- Blood Cultures (2X)
• If infiltrate is observed on chest x-ray, sputum Gram stain and culture
  - All patients will have a nasopharyngeal wash for viral isolation and rapid viral diagnostics
    (EIA for RSV, if negative DFA for RSV; DFA for influenza A and B, DFA for parainfluenza)
  - Lab has agreed to do rapid test for viruses year-round for lab workers.
  - Patients with cutaneous ulcers will have a Gram stain and culture from the ulcer.
  - Patients with GI symptoms will have stool examined for enteric pathogens and radiographic
    studies as deemed necessary by the examining physician

Isolation Procedures: Isolation is not necessary for lab workers without a known exposure
  and gross contamination

Antibiotic Therapy: All patients will receive empiric therapy for any febrile illness until the
diagnostic evaluation reveals an alternative diagnosis and/or symptoms resolve.
  - Therapy will be IV ciprofloxacin 400 mg IV q 12 hours for patients with sepsis or
    respiratory distress. Other patients may receive ciprofloxacin 500 mg PO every 12 hours.
  - Patients with an allergy to fluroquinolones will receive IV penicillin or doxycycline if
    parenteral therapy is necessary
  - Otherwise amoxicillin 500 mg PO every 8 hours or doxycycline 100 mg PO every 12 hours
    will be administered
  - Antibiotic therapy will continue for 60 days unless diagnostic evaluation has revealed
    another etiology for the febrile illness

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