

GLANDERS

Bioterrorism Agent Profiles for Health Care Workers

Causative Agent: Glanders is a zoonotic disease caused by the gram-negative bacillus *Burkholderia mallei*. Though primarily a disease of horses, mules, and donkeys, human illness can sometimes occur. Glanders is endemic in parts of Africa, Asia, Europe, and Central and South America.

Routes of Exposure: Humans are primarily exposed to glanders through direct contact with infected animals.

Infective Dose & Infectivity: The infective dose is assumed to be low and all people are considered susceptible.

Incubation Period: The incubation period ranges from 10 to 14 days.

Clinical Effects: Infection with glanders can range from asymptomatic acquisition to life-threatening pneumonia and bacteremia. Pulmonary infection can occur from inhalation or hematogenous spread. Chest radiographs can show lobar pneumonia, pulmonary abscesses, pleural effusions, and/or small military lesions. Bacteremia is accompanied by signs of sepsis and can include abscesses throughout the body and multiple cutaneous pustules. Mucous membrane infection manifests as nasal ulcers and nodules that secrete a bloody discharge. After contamination of broken skin, local ulcerative lesions develop with enlarged regional lymph nodes. Some people develop chronic infection with necrotizing granulomas in the liver and spleen and muscles of the arms and legs.

Lethality: When untreated, septicemia is usually fatal within 7-10 days.

Transmissibility: *B. mallei* is generally transmitted from animals to humans by invasion of nasal, oral, and conjunctival mucous membranes; by inhalation into the lungs; or through lacerated or abraded skin. Additionally, direct contact with an infected person's body fluids can lead to person-to-person transmission.

Primary contaminations & Methods of Dissemination: As a bioterrorism weapon, glanders would most likely be delivered via aerosolization.

Secondary Contamination & Persistence of organism: Secondary cases may occur through improper handling of infected secretions. However, humans have seldom acquired infection from infected animals despite frequent and close contact.

Decontamination & Isolation:

Patients – Standard precautions should be practiced. Contact precautions should be used with skin lesions and secretions. Patients with direct exposure to aerosols should be washed with soap and water.

Equipment, clothing & other objects – 0.5% hypochlorite solution (one part household bleach and 9 parts water = 0.5% solution) is effective for environmental decontamination.

Laboratory testing: Gram stain of lesion exudates reveals small gram-negative bacteria. These stain irregularly with methylene blue. *B. mallei* grows slowly on ordinary nutrient agar. Agglutination tests are not positive for 7-10 days, and a high background titer in normal sera (1:320 to 1:640) makes interpretation difficult. Complement fixation tests are more specific and are considered positive if the titer is equal to, or exceeds 1:20. Cultures of autopsy nodules in septicemic cases will usually establish the presence of *B. mallei*.

Therapeutic Treatment: There is little experience in treating glanders in humans; therefore few antibiotics have been evaluated *in vivo*. Treatment varies with the type and severity of the clinical disease. Severe disease requires initial parenteral therapy. Prolonged oral antibiotic therapy for many months is required to prevent relapse. Parenteral regimens have included combinations such as cetazidime and trimethoprim-sulfamethoxazole, or imipenem and doxycycline. Various isolates have markedly different antibiotic sensitivities, so each isolate should be tested for its own individual resistance pattern.

Prophylactic Treatment: There is no vaccine available for human use. Post-exposure chemoprophylaxis has not been established, although it has been suggested that trimethoprim-sulfamethoxazole may be tried.

Differential Diagnosis: The differential diagnosis depends on the clinical manifestations. In addition to common causes of pneumonia, potential agents of bioterrorism and zoonotic diseases would include melioidosis, plague, and tularemia. The papular or pustular skin lesions of glanders can resemble the rash of smallpox.

References:

Marty AM. Melioidosis and Glanders In: Physician's Guide to Terrorist Attack. Roy MJ, ed. Physician's Guide to Terrorist Attack. Totowa, NJ: Humana Press, Inc.; 2004:143-159

Kortepeter M, Christopher G, Cieslak T, et al. Medical Management of Biological Casualties Handbook, U.S. Army Medical Research Institute of Infectious Diseases, U.S. Department of Defense; 2001: 37-42

Available at <http://www.usamriid.army.mil/education/bluebook.htm>

For more information call (602) 364-3289

Frequently Asked Questions About Glanders

What is glanders?

Glanders is an infectious disease that is caused by the bacterium *Burkholderia mallei*. Glanders is primarily a disease affecting horses, but it also affects donkeys and mules and can be naturally contracted by goats, dogs, and cats. Human infection, although not seen in the United States since 1945, has occurred rarely and sporadically among laboratory workers and those in direct and prolonged contact with infected, domestic animals.

Why has glanders become a current issue?

Burkholderia mallei is an organism that is associated with infections in laboratory workers because so very few organisms are required to cause disease. The organism has been considered as a potential agent for biological warfare and of biological terrorism.

How common is glanders?

The United States has not seen any naturally occurring cases since the 1940s. However, it is still commonly seen among domestic animals in Africa, Asia, the Middle East, and Central and South America.

How is glanders transmitted and who can get it?

Glanders is transmitted to humans by direct contact with infected animals. The bacteria enter the body through the skin and through mucosal surfaces of the eyes and nose. The sporadic cases have been documented in veterinarians, horse caretakers, and laboratorians.

What are the symptoms of glanders?

The symptoms of glanders depend upon the route of infection with the organism. The types of infection include localized, pus-forming cutaneous infections, pulmonary infections, bloodstream infections, and chronic suppurative infections of the skin. Generalized symptoms of glanders include fever, muscle aches, chest pain, muscle tightness, and headache. Additional symptoms have included excessive tearing of the eyes, light sensitivity, and diarrhea.

- *Localized infections* – If there is a cut or scratch in the skin, a localized infection with ulceration will develop within 1 to 5 days at the site where the bacteria entered the body. Swollen lymph nodes may also be apparent. Infections involving the mucous membranes in the eyes, nose, and respiratory tract will cause increased mucus production from the affected sites.
- *Pulmonary infections* - In pulmonary infections, pneumonia, pulmonary abscesses, and pleural effusion can occur. Chest X-rays will show localized infection in the lobes of the lungs.
- *Bloodstream infections* - Glanders bloodstream infections are usually fatal within 7 to 10 days.
- *Chronic infections* - The chronic form of glanders involves multiple abscesses within the muscles of the arms and legs or in the spleen or liver.

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Where is glanders usually found?

Geographically, the disease is endemic in Africa, Asia, the Middle East, and Central and South America.

How is glanders diagnosed?

The disease is diagnosed in the laboratory by isolating *Burkholderia mallei* from blood, sputum, urine, or skin lesions. Serologic assays are not available.

Can glanders spread from person to person?

In addition to animal exposure, cases of human-to-human transmission have been reported. These cases included two suggested cases of sexual transmission and several cases in family members who cared for the patients.

Is there a way to prevent infection?

There is no vaccine available for glanders. In countries where glanders is endemic in animals, prevention of the disease in humans involves identification and elimination of the infection in the animal population. Within the health care setting, transmission can be prevented by using common blood and body fluid precautions.

Is there a treatment for glanders?

Because human cases of glanders are rare, there is limited information about antibiotic treatment of the organism in humans. Sulfadiazine has been found to be effective in experimental animals and in humans.

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