



GLANDERS

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Definition Glanders is a contagious disease caused by *Burkholderia mallei*, a gram negative, non-motile, non-encapsulated and non-spore forming bacillus in the bacterial family *Burkholderiaceae*. It has been recognized for millennia as a disease of *equidae* and humans. Glanders can also affect *Felidae*, small ruminants, camels, bears and walruses. In 1934, glanders was officially eradicated in domestic animals in the USA. The disease has been eradicated in North America, Australia and Europe through import control measures coupled with testing and elimination of any infected animals. However, Glanders continues to be present in a number of Asian, African, Middle Eastern, and South American countries. Recent outbreaks in countries from which it was previously eradicated indicate that Glanders is no longer as geographically restricted in terms of its global distribution. Glanders is an OIE listed equine disease and a transboundary disease in the USA. As such, it is immediately reportable to the United States Department of Agriculture (USDA) and State Animal Health Officials in all 50 states and territories.

Clinical Signs/Disease Manifestation Glanders can present in several forms, nasal, pulmonary and cutaneous, depending on the location of the primary lesion. The course of the disease may be acute or chronic. Acutely affected horses usually die within a few days to several weeks. Clinical signs associated with early infection or sub-clinically/asymptomatically infected carriers (Occult Glanders) can be non-specific or non-existent, emphasizing the importance of these horses as a source of infection.

Nasal Form

- Begins with high fever, inappetance, dyspnea and coughing
- A highly infectious, viscous, yellowish-green, mucopurulent or sanguinopurulent nasal discharge
- Purulent ocular discharge
- Nodules in nasal, pharyngeal or tracheal mucosa may produce visible ulceration and form stellate scars
- Regional lymph nodes are enlarged and indurated

Pulmonary Form

- Usually requires several months to develop; first manifests itself through fever, dyspnea, paroxysmal coughing or a persistent dry cough



- Diarrhea and polyuria may also occur; all leading to a progressive loss of condition

Cutaneous Form (farcy)

- Develops insidiously over an extended period.
- Initially coughing, dyspnea, fever, lymphadenomegaly and lymphangitis leading to weight loss and debilitation.
- Subcutaneous nodules develop along lymphatics of the face, legs, costal region or ventral abdomen.
- Nodules may rupture and ulcerate resulting in multifocal dermatitis.

Occult Glanders

- Horses which are sub-clinically/asymptotically infected and can be carriers.

Differential Diagnosis Melioidosis (*B. pseudomallei*), strangles, ulcerative lymphangitis, epizootic lymphangitis, tuberculosis, sporotrichosis, botryomycosis and horse pox.

Incubation Period In natural infection, the incubation period can be weeks to months; it varies according to route and extent of exposure, and host and environmental factors.

Risk Factors

- High animal density and close proximity
- Exposure to clinically ill or sub-clinically/asymptotically infected carrier animals (Occult Glanders)

Transmission Direct physical contact with horses affected with nasal or pulmonary forms of the disease.
Indirectly through ingestion of food or water contaminated with discharges from an infected animal. It can also be contracted through shared feed or water containers, tack, grooming equipment and other fomites.

Diagnostic Sampling, Testing, and Handling All manipulations with potentially infectious material must be performed in a laboratory that meets the requirements for Containment Group 3 pathogens. Federal and/ or a state animal health official should be contacted immediately if a case of Glanders is suspected to assist in the appropriate diagnostic testing. Samples should include serum, whole blood and swabs for culture. In addition, air-dried smears of exudate and tissue lesions including some in 10% buffered formalin should be submitted to National Veterinary Services Laboratories, Ames, Iowa.

Smears from fresh exudate may reveal Gram-negative non-sporulating, non-encapsulated rods. Culture and identification are used to confirm the diagnosis. Serological tests such as complement fixation test and ELISA can give rise to false positives in areas where melioidosis (*B. pseudomallei*) is endemic. These tests should be confirmed with a second test with equal or higher sensitivity and higher specificity, e.g. *B. mallei*-specific lipopolysaccharide (LPS)-western blot, I-ELISA



	<p>(indirect enzyme-linked immunosorbent assay) (based on recombinant protein from type VI secretion system) or C-ELISA (competitive ELISA) (based on <i>B. mallei</i>-specific monoclonal antibodies).</p>
Recommended Action if Glanders is Suspected	<p>Glanders is an internationally reportable disease, contact your regulatory authority for reporting suspect cases. In the United States contact your State and/or federal animal health official.</p> <p>Federal Area Veterinarians in Charge https://www.aphis.usda.gov/animal_health/contacts/field-operations-districts.pdf</p> <p>State Veterinarians http://www.equinediseasecc.org/state-veterinary-offices</p>
Specific Control Measures and Biosecurity Issues	<p>Critical to effective prevention and control of glanders is prompt identification, euthanasia and appropriate disposal of all positive cases of the disease. <i>Burkholderia mallei</i> is killed by direct sunlight, desiccation and common disinfectants. Affected premises shall be quarantined and movement controls strictly enforced. Potentially contaminated areas must be disinfected, thoroughly cleaned and re-disinfected. All feed/bedding must be destroyed. Complete eradication can only be achieved through a comprehensive, long-term testing program of all at-risk equids and a rigorously enforced culling program of any additional cases of the disease that might be turned up. While antibiotic treatment of affected animals is resorted to in some areas of the world where glanders is endemic, it is not the accepted option for most countries when dealing with an outbreak of the disease.</p>
Zoonotic Concern	<p>Glanders is an occupational concern for veterinarians, farriers, and other animal workers, as well as laboratory personnel. Dogs, cats and small ruminants such as goats, can be infective and transmit disease to humans. Infection with <i>B. mallei</i> is very painful and can be fatal. Humans can develop a chronic or acute form with nodules and abscessation similar to animals. Nodules may be seen on the face, legs, arms and nasal mucosa, progressing to pyemia, metastatic pneumonia, and not infrequently death. Without antibiotic treatment, disease in humans is fatal; untreated acute disease in humans has a 95% mortality rate within 3 weeks. With antibiotic treatment, the prognosis is more favorable.</p>
Additional Resources	<p>Spickler, AR, Roth, JA, Gaylon, J & Lofstedt, J. (2010) Glanders <i>In: Emerging and Exotic Diseases of Animals</i> 4th ED. Iowa State University, Ames, IA, 172-175</p> <p>Fernandez, PJ & White, WR. (2010) Glanders <i>In: Atlas of Transboundary Animal Diseases</i>. OIE (World Organization of Animal Health) 99-106</p> <p>2018 Manual of Diagnostic Tests and Vaccines for Terrestrial Animals 8th ED. OIE (World Organization of Animal Health) 1350-1362</p>



AAEP Infectious Disease Guidelines: Glanders

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