## ACTINOMYCOSIS

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<th>Animal Group(s) Affected</th>
<th>Transmission</th>
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<td>Many mammal species, including humans; birds</td>
<td>Endogenous infection into susceptible tissues or by bite wound</td>
<td>Local abscesses, chronic draining fistulas, bony infections, or infections of body cavities. Clinical signs referable to the involved area</td>
<td>Can be mild if restricted to local infection but can be fatal depending on infection location, spread, and time to diagnosis.</td>
<td>Surgical drainage and debridement. Appropriate antibiotic therapy continued for several weeks after elimination of clinical signs.</td>
<td>Ensure good oral care. Limit the amount of rough forage fed and limit the number of plant awns in environment.</td>
<td>Yes, but most human infections are endogenous.</td>
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**Fact Sheet compiled by:** Rebecca Bloch  
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**Fact Sheet Reviewed by:** Amy Swinford, John Gilliam

**Susceptible animal groups:** Horses, cattle, small carnivores, goats, sheep, wild ruminants, monkeys, rabbits, squirrels, hamsters, marsupials, humans, river otter, and birds

**Causative organism:** *Actinomyces* spp. including *A. bovis*, *A. hodeovulneris*, *A. israelii*, *A. naeslundii*, *A. pyogenes*, *A. suis*, and *A. viscosus*. These organisms are anaerobic to microaerophilic, Gram positive, rod shaped bacteria that may produce branching filaments. The disease process termed lumpy jaw has many bacterial agents that include *Fusobacterium necrophorum*, *Bacteroides*, *Streptococcus*, *Staphylococcus*, *Corynebacterium*, *Nocardia*, and *Actinobacillus* in addition to *Actinomyces* species. *A. bovis* has been stated as being the causative agent of lumpy jaw in cattle but it has also been suggested that *Actinomyces* infection in exotic bovids is secondary to a tooth root infection, rather than a primary infection (J. Oosterhuis personal communication). If the mandible undergoes a traumatic incident that interrupts the blood supply to a tooth causing it to become devitalized, this damage leads to necrosis and then secondary invasion by various bacteria, including *Actinomyces* species.

**Zoonotic potential:** Generally, the disease is not contagious except via bite wounds. The only suggested documented zoonotic infection in the literature was caused by *Actinomyces pyogenes*, since reclassified as *Arcanobacterium pyogenes*.

**Distribution:** Normal flora of the oral and nasopharyngeal membranes. This species is secondarily found in the gastrointestinal tract. In humans, these organisms are also found in the female genitourinary tract.

**Incubation period:** This organism requires 24-48h for growth in media but infections are endogenous and require introduction of the bacteria into susceptible tissue to initiate infection generally through tissue trauma or, less frequently, through bite wound.

**Clinical signs:** Lesions include localized abscesses, chronic draining fistulas, bone infections, or infections of body cavities. Drainage from the lesions is serosanguinous and often contains small yellow granules. Infection may be associated with fever. Clinical signs are referable to the area of involvement. In cattle, humans, and marsupials, *Actinomyces* sp. associated with osteomyelitis is characterized by dislodgement of teeth, inability to chew, and mandibular fractures. In several hosts, this bacterium can cause soft tissue infections. In horses, it may manifest as supra-atlantal or supraspinous bursitis, or sometimes cervical abscesses. *Actinomyces* endophthalmitis has been documented in a dog. *Actinomyces* spp. has been associated with plant awn foreign
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bodies and associated disease such as discospondylitis, in small carnivores. In humans, in addition to other sites of infection, actinomycosis can be associated with contraceptive intrauterine devices. 

*Actinobacillus bovis* is associated with osteomyelitis in cattle, typically causing formation of periosteal new bone and abscesses in the soft tissues of the head, esophagus, forestomachs, and trachea.

*Actinobacillus actinoides* is occasionally found in enzootic pneumonia of calves and seminal vasculitis in bulls. *Actinobacillus hordovulneris* causes localized abscesses and systemic infections such as pleuritis, peritonitis, visceral abscesses, and septic arthritis in dogs. Infection is associated with migrating plant awns.

*Actinobacillus israelii* is associated with chronic granulomatous infections in humans but has rarely been isolated from pyogranulomatous lesions in pigs and cattle. *Actinobacillus neslundii* has been isolated from supplicative infections in several animal species, the most common being aborted porcine fetuses. *Actinobacillus pyogenes* (currently *Arcanobacter pyogenes*) is associated with infections in many organ systems in many species of animals. Infections include suppurative mastitis, suppurative pneumonia, septicemia, vegetative endocarditits, endometritis, intracranial abscesses or suppurative meningoencephalitis, septic arthritis, wound infections, and liver abscesses.

*Actinobacillus suis* causes pyogranulomatous porcine mastitis. Chronic, deep seated abscesses may fistulate. *Actinobacillus viscosus* causes chronic pneumonia, pyothorax, and localized subcutaneous abscesses in dogs. Thoracic lesions are pyogranulomatous while cutaneous lesions are granulomatous abscesses, often with fistulous tracts. Lesions generally develop after a traumatic injury such as a bite wound.

*Actinobacillus denticolens* has been reported to cause mandibular lymphadenopathy in horses with possible fever, nasal discharge, and depression, making it clinically similar to strangles.

**Post mortem, gross, or histologic findings:** Aggregates of Gram positive, filamentous, non-acid-fast bacteria with associated inflammation in the areas of infection. While it is possible to detect *Actinomyces* sp in tissue sections stained with hematoxylin and eosin (sulfur granules are round or oval basophilic masses with a radiating arrangement of eosinophilic terminal clubs), special stains such as Gomori methenamine silver, paminosalicylic acid, McCallen-Goodpasture, and Brown-Benn may be needed.

**Diagnosis:** Grossly, yellowish particles up to several millimeters in diameter in the lesions or tissue may be observed. These particles, called sulfur granules, are suggestive of *Actinomyces* infection but can also be seen with other types of bacteria (*Nocardia* sp.). In the case of *Actinobacillus viscosus* infection soft, grayish white granules may be seen in the pus or exudate. Clinical presentation, Gram stain, and histopathologic visualization of the bacteria and granules are supportive of the diagnosis. Definitive diagnosis requires culture but is not always possible as this group of organisms is sometimes difficult to grow.

**Material required for laboratory analysis:** Culture swab or tissue sample from the affected area.

**Relevant diagnostic laboratories:** Any laboratory capable of running bacterial cultures should be able to culture this organism. Although most strains do not require anaerobic incubation, they do benefit from increased carbon dioxide concentration.

**Treatment:** Appropriate surgical drainage or debridement in addition to antimicrobial administration. Iodine compounds, penicillin, and isoniazid have been used to treat bovine cases. In small carnivores, a penicillin derivative is the drug of choice but penicillins have difficulty penetrating pyogranulomatous lesions which may necessitate prolonged therapy. Chloramphenicol and clindamycin can also be used. Antibiotic impregnated beads have been used in the treatment of bone infections. A published suggestion for treatment of jaw osteomyelitis includes surgical debridement of the lesion followed by surgical fistulation to allow lavage with sterile water, hydrogen peroxide, 5.25% sodium hypochlorite, and then 2% Betadine. Once infection is eliminated or contained, surgical repair of the tooth and bony defect can occur.

**Prevention and control:** Reduce feeding of rough or excessively fibrous plant material that might cause...
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Trauma to the oral cavity. Reduce any environmental stressors such as overcrowding. Good oral care to help prevent food impaction or entry of bacteria in dental caries.

**Suggested disinfectant for housing facilities:** Since *Actinomyces* sp. are normal flora and generally found in the oral cavity of the animals they effect, environmental decontamination of the environment has less importance. However, the bacteria can reside in the environment in organic material and these organisms can be removed through thorough cleaning of any organic material from the environment followed by disinfection with 10% bleach or any of the commercially available disinfectants mixed to manufacturer’s instructions.

**Notification:** None

**Measures required under the Animal Disease Surveillance Plan:** None

**Measures required for introducing animals to infected animal:** Since most infections are endogenous, unless the infected animal is likely to bite another animal, no special measures beyond individual health care need to be taken.

**Conditions for restoring disease-free status after an outbreak:** Special attention should be paid to husbandry practices and oral care in the animals of concern.

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**References:**
