

Klebsiella species (*K. oxytoca*, *K. pneumoniae*)

Classification

Gram-negative, non-motile, facultatively anaerobic rods

Family

Enterobacteriaceae

Affected species

All known mammalian species, including common laboratory rodent and lagomorph species, as well as many other vertebrates and invertebrates, are susceptible to colonization with *Klebsiella*. Due to its ability to colonize a wide range of species, *Klebsiella* can be readily transmitted from one species to another, including from humans to animals and vice versa. These organisms are important causes of human nosocomial infections.

Frequency

Klebsiella spp. are common in laboratory animal facilities. These bacteria may also be found as free-living bacteria in the environment and as part of normal human gut flora.

Transmission

Klebsiella colonizes the gut preferentially, although it may also be found on the skin and in the nasopharynx, and transmission is probably fecal-oral or via direct contact. Colonization of laboratory animals may be from human caretakers or from exposure to soil.

Clinical Signs and Lesions

Very rare in immunocompetent animals. These organisms are low-level opportunists. Immunodeficient animals are more susceptible to disease caused by opportunistic organisms, and *Klebsiella* is no exception. *Klebsiella* infection may also be seen after antibiotic treatment, which presumably damages the beneficial flora and allows overgrowth of *Klebsiella*. There is no pattern of infection or characteristic *Klebsiella*-associated lesion. Lesions and clinical signs are those generally

associated with Gram-negative bacterial infections, such as poor body condition, ruffled hair coat, otitis media, urogenital tract infections, abscesses, or sepsis. On histologic examination, lesions are generally characterized as suppurative.

Diagnosis

Diagnosis of *Klebsiella* infection is by culture and biochemical identification in animals exhibiting clinical signs. *Klebsiella* grows well on most nutrient media and common culture conditions. *Klebsiella* form large, moist colonies on culture. *K. oxytoca* and *K. pneumoniae* are differentiated biochemically in that *K. pneumoniae* is indole-negative.

Interference with Research

The presence of *Klebsiella* as a component of the normal flora of a healthy laboratory rodent is of little significance. If animals are to be used for models of human Gram-negative sepsis or pneumonia with *Klebsiella* as the inciting organism, they should be free of *Klebsiella*. Immunodeficient animals, especially those with severe immunodeficiencies, or defects of the innate immune system, may develop clinical disease associated with *Klebsiella* infection.

Prevention and Treatment

To prevent colonization of animals with *Klebsiella*, the animals must be raised in strict bioexclusion housing, as would be necessary for immunodeficient mice. Treatment is not recommended. Treatment of animals with antimicrobials may serve to treat illness, but rarely, if ever, resolves the carrier state, nor will antibiotic treatment eliminate bacteria from the bedding or cage surfaces. Human clinical isolates of *Klebsiella* are often multi-drug resistant.

As a non-spore-former, *Klebsiella* is susceptible to most common disinfectants used in animal facilities. Theoretically, any chemical or mechanical sterilant will be effective against *Klebsiella* in the environment.

technical sheet

However, *Klebsiella* forms biofilms, which may shield it from common disinfection or sterilization agents unless the biofilm is first mechanically disrupted. To obtain animals without *Klebsiella*, animals should be rederived through embryo transfer or hysterectomy into/onto *Klebsiella*-free dams.

References

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