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accelerating drug development. exactly.

Pseudomonas aeruginosa

Classification

Aerobic, Gram-negative rod; motile, with a single terminal flagellum

Family

Pseudomonadaceae

Affected species

Innumerable metazoa and many plant species may be at least transiently colonized by *Pseudomonas* spp. In mammals, colonization of wet or moist anatomic sites, including gut and respiratory tract, as well as chronically wet areas of fur, are the most common.

Frequency

Generally, *Pseudomonas* spp. are free-living in the environment. Free-living bacteria, including *P. aeruginosa*, are ubiquitous in the environment (water and soil) and may even play a role in nucleation of rain. They are also commonly found in watering systems for animals and humans. Unless specifically monitored for and excluded, many animals are likely to transiently harbor this organism. Animals on long-term antibiotic treatment with the attendant disruption of gut flora may have longer-term colonization.

Transmission

Transmission is unlikely between animals. Colonization of animals is most commonly due to exposure to water containing *P. aeruginosa*. In animals with a full complement of "normal" gut flora, binding of *P. aeruginosa* to the surface of the gut mucosa is thought to be prevented by these resident bacteria. Granulocytes, primarily neutrophils, provide the first line of host defense against any *P. aeruginosa* that has entered through wounds or crossed the mucosa.

Clinical Signs and Lesions

In immunocompetent animals and many immunodeficient animals, there are no clinical signs associated with *P. aeruginosa* colonization. *P. aeruginosa* becomes a significant clinical problem in neutropenic animals, however, such as mice that are irradiated or treated with an anti-mitotic agent (such as many chemotherapeutic compounds). In these severely immunodeficient animals, *P. aeruginosa* transits the nasopharyngeal or gut mucosal barrier and causes a systemic bacteremia and sepsis. Clinical signs may include death with no premonitory signs, conjunctivitis, nasal discharge, or general signs of rodent illness, including anorexia, ruffled fur, and hunched posture.

Diagnosis

Diagnosis of *P. aeruginosa* infection is by culture and biochemical identification in animals exhibiting clinical signs, especially those known to be leukopenic. *P. aeruginosa* grows well on most culture media and colonies are often a distinctive blue-green. *P. aeruginosa* is also fluorescent under ultraviolet light.

Interference with Research

In mice and rats, there is no known interference with research associated with the carrier state. Immunodeficient animals, animals that will be rendered immunodeficient for research purposes, or animals intended for cystic fibrosis research should be free of *P. aeruginosa*.

Prevention and Treatment

To prevent colonization of animals with *P. aeruginosa*, the animals must be raised in strict bioexclusion housing, as would be necessary for immunodeficient mice. Water quality is of considerable importance and ideally should be sterilized before use with immunodeficient animals, especially those that are neutropenic.

P. aeruginosa is susceptible to most common disinfectants used in animal facilities. Theoretically, any chemical or mechanical sterilant will be effective against *P. aeruginosa* in the environment. However, *P. aeruginosa* is commonly found growing in biofilms, which may shield it from common disinfection or sterilization agents unless the biofilm is first mechanically disrupted. To obtain animals without *P. aeruginosa*, animals should be rederived through embryo transfer or hysterectomy into/onto *P. aeruginosa*-free dams.

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