

Clostridium piliforme (Tyzzer's disease, CPIL)

Classification

Gram-negative filamentous rod-shaped bacterium

Family

Clostridiaceae

Affected species

Laboratory rodents and rabbits are susceptible to this organism, as are many other mammals. There is evidence for host species specificity among *C. piliforme* strains, but it is not certain if this is absolute.

Frequency

Varying. In general, modern laboratory rodent populations are free of *C. piliforme*, but pockets of increased prevalence may exist. Prevalence in pet and wild animal populations is unknown. Tyzzer's disease, as distinct from asymptomatic infection, primarily occurs in conditions of poor husbandry or with immunosuppression.

Transmission

Transmission is through ingestion of spores from the environment or in the feces of an infected animal. Spores can remain infectious for at least a year.

Zoonotic infection with *C. piliforme* has been reported in a patient with AIDS. Immunosuppressed workers should consult their physicians about working with animals that carry *C. piliforme*.

Clinical Signs and Lesions

Animals may harbor *C. piliforme* with no clinical signs, and immunocompetent animals clear infection within a few weeks. Symptomatic disease is infrequent in modern facilities. However, with poor husbandry or immunosuppression, clinical signs may emerge. The typical presentation of Tyzzer's disease is seen in recently weaned animals. Animals are inappetent, thin, and have ruffled fur. Rats may have a greatly distended abdomen. There may or may not be diarrhea in rodents; there is usually diarrhea in rabbits. Acute death with no clinical signs may also be seen with Tyzzer's disease.

At necropsy, the classic presentation of Tyzzer's disease in most laboratory rodent species involves white spots on and in the liver (necrotizing hepatitis). There is often a necrotizing ileitis, typhlitis, or colitis, and the mesenteric lymph nodes may be enlarged. Rats may also have a greatly enlarged ileum. The heart may also be involved in Tyzzer's disease. If this is the case, pale streaks or areas may be seen in the epicardium or myocardium.

Diagnosis

C. piliforme is an endospore-forming intracellular obligate anaerobe. It may be grown in embryonated hens' eggs and some mammalian cell cultures. Most laboratories are not able to directly culture *C. piliforme*.

Serology is often used as a screening tool and has good negative predictive value. However, due to the complex nature of bacterial antigens, the assay may yield false positive results. In the case of positive serology in a large number of animals tested, the next step should be to perform a stress test. Injecting animals with cyclophosphamide will suppress their immune systems and allow any pathogenic *C. piliforme* present to become manifest. If animals present with disease, they should be euthanized and the ileo-ceco-colic junction and liver taken for histopathology. Liver smears stained with Giemsa are often diagnostic, allowing rapid diagnosis. Giemsa or Warthin-Starry staining of histologic sections where necrotizing lesions are present should reveal the filamentous bacteria in enterocytes or hepatocytes. If the animals do not present with clinical disease, then the serology was a false positive, or the animals may have a non-toxigenic strain of *C. piliforme*.

PCR is also available for *C. piliforme*, but since the organism is cleared from immunocompetent animals, negative PCR results are not especially useful for screening clinically healthy animals. However, PCR on fecal samples can help determine if an animal is shedding *C. piliforme* spores, and PCR of lesions is a useful adjunct to histopathology.

technical sheet

Interference with Research

Animals with overt Tyzzer's disease are clinically ill and unfit for use. Colonies with enzootic *C. piliforme* may experience sudden losses of weanlings or subadults if animals are stressed. Rabbits recovering from the disease will have necrosis and fibrosis of the liver and fibrosis of the large intestine. There is documentation in the literature of unapparent infections in mice and rats, but no documentation of recovery from clinical disease.

Prevention and Treatment

Prevention of Tyzzer's disease is accomplished by protecting animals from exposure to *C. piliforme* spores. These spores are infective for long periods of time in the environment. The organism has a wide host range, although many isolates seem to be species-specific. *C. piliforme* can be carried by a wide variety of animals, so protecting laboratory animals from wild and pet animals is key.

There is no effective treatment for Tyzzer's disease. The organism may be eliminated from a colony through embryo transfer or hysterectomy rederivation. Since *C. piliforme* is a spore-forming organism, special care must be taken with the environment. Items that can be autoclaved should be, otherwise, non-essential items should be discarded, and the area treated with a chemical sterilant, such as chlorine dioxide or formalin.

References

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