

Tyzzler's disease and Australian wildlife

Fact sheet

Introductory statement

Tyzzler's disease is an uncommon, but fatal, bacterial disease of marsupials, spread predominantly by rodents. It is believed to occur Australia wide, mainly in captive animals.

Aetiology

Tyzzler's disease is caused by *Clostridium piliforme*, previously known as *Bacillus piliformis*, a motile, filamentous, Gram negative, spore-forming, obligate intracellular bacterium (Wobeser 2001).

Natural hosts

Rodents appear to be the natural hosts of the organism. They may be clinically affected but can also be latently infected, showing no clinical signs but potentially spreading the bacteria to other species. Disease has occurred in a wide range of mammals including marsupials. Captive, juvenile possums appear to be highly susceptible (Rose 2005).

World distribution

The disease occurs worldwide.

Occurrences in Australia

The disease is thought to occur Australia wide. Most reports of affected marsupials involve captive animals and include a Herbert River ringtail possum (*Pseudocheirus herbertensis*) from Queensland, a common brushtail possum (*Trichosurus vulpecula*), and wombat (species unspecified) from NSW, and a common ringtail possum (*Pseudocheirus peregrinus*), koala (*Phascolarctos cinereus*), a Tasmanian devil (*Sarcophilus harrisii*) and antechinus (species unspecified) from Victoria (Hum and Best 1988; Canfield and Hartley 1991; Holz 2008, Ladds 2009). Two cases in a wild common brushtail possum and a common ringtail possum from Sydney have been reported (Canfield and Hartley 1991). An outbreak occurred in juvenile common ringtail

possums that were housed with a wildlife carer in Victoria (eWHIS 1585). Fourteen possums died in December 2007 with a further death occurring in March 2008. The common brushtail possums that were housed with the ringtail possums remained clinically unaffected.

Tyzzer's disease has also occurred in native rodents, being diagnosed in spinifex hopping mice (*Notomys alexis*) held at Healesville Sanctuary, Victoria (P. Holz unpublished, eWHIS 4569) and in a research facility in South Australia, and in fawn hopping mice (*N. cervinus*) (Watts 1982, Ladds 2009). It has also been reported in captive Mitchell's hopping mice (*N. mitchellii*) and common rock rats (*Zyomys argurus*) (Breed and Eden 2008).

NOTE: In the US Tyzzer's disease has been reported in at least three captive bird species (cockatiel (*Nymphicus hollandicus*), brown-throated conure (*Aratinga pertinax*) and rainbow lorikeet (*Trichoglossus haematodus*) (Speare et al 1984, Canfield and Hartley 1991, Saunders et al 1993, Rakich and Latimer 1998, Raymond et al 2001). The cockatiel and rainbow lorikeet are native to Australia. We are not aware of any other reports of Tyzzer's disease in Australian native birds, either in captivity or in the wild.

Epidemiology

Rodents act as a reservoir for the organism with clinically unaffected animals transmitting the agent in their faeces. Transplacental infection has been recorded in mice. Transmission is via the oro-faecal route. Food or bedding may become contaminated with bacterial spores, which may survive for over a year in bedding or soil (Breed and Eden 2008).

Clinical disease generally occurs among animals stressed by poor sanitation, overcrowding, capture, transport or by the administration of corticosteroids (Wobeser 2001). Most cases in Australian native mammals are reported to occur in captive juveniles (Ladds 2009) and may be associated with poor husbandry (Rose 2005).

Clinical signs

The disease is usually acute, with a course of less than two days, and few or no clinical signs. Animals are often found dead. Signs, when they occur, include diarrhoea, weakness, depression, altered behaviour fever, dyspnoea, jaundice, anorexia and occasionally convulsions (Ladds 2009).

Diagnosis

Because of the short course of the disease, it is rarely diagnosed ante mortem. A post mortem diagnosis is based on typical lesions containing intracellular bacteria which stain strongly with silver stains (below).

Clinical pathology

None described, because animals die so rapidly.

Pathology

In eutherian mammals Tyzzer's disease is an intestinal and hepatic disease (Wobeser 2001). However, in cases described in marsupials and birds, lesions occur in the liver and heart but not the intestines. Gross changes include a swollen, mottled and congested liver, with scattered haemorrhages and pinpoint white foci. The heart may show irregular white patches and haemorrhages with increased pericardial fluid (Ladds 2009).

Microscopically, there are extensive areas of multifocal intralobular hepatocellular necrosis. Lesions consist of areas of coagulative necrosis with or without haemorrhage and neutrophilic infiltrates. Neutrophil karyorrhexis may be prominent. Slender faintly basophilic rods are visible, using haematoxylin and eosin, within hepatocytes on the periphery of lesions. These rods are more obvious with use of silver stains (Ladds 2009).

Microscopic lesions in cardiac muscle, seen in possums, include central muscle fibre loss with a neutrophilic infiltrate. Occasional fibres were undergoing coagulative necrosis. Slender rods were visible in peripheral cardiac fibres (Canfield and Hartley 1991).

Differential diagnoses

As the majority of affected animals are found dead or display only vague clinical signs for a day or two before dying, differential diagnoses include any rapidly fatal infections or toxic agents.

Laboratory diagnostic specimens

Sections of liver and heart should be submitted fresh and in formalin.

Laboratory procedures

Sections of liver and heart should be stained with silver stains to reveal the characteristic intracellular bacteria. The organism cannot be grown on cell-free media but can be cultivated in embryonated hen's eggs and several mammalian cell lines (Wobeser 2001).

Treatment

The organism is sensitive to tetracycline and enrofloxacin and partially sensitive to streptomycin, erythromycin, penicillin, and chlortetracycline. It is resistant to sulfonamides and chloramphenicol. Because of the short course of the disease treatment is generally unsuccessful, but may be useful in an outbreak situation.

Prevention and control

Prevention and control focus on optimising husbandry and decreasing exposure to any potential stressors. Rodent exclusion is also important.

The spores are very resistant and remain infectious for one year at room temperature, 16 months at -10 °C and one hour at 60 °C. One study found the environment remained infectious for muskrats (*Ondatra zibethicus*) for five years after the last clinical case (Wobeser 2001). Spores can be killed with a 0.3% solution of sodium hypochlorite or by heating to 80 °C for thirty minutes (Jenkins 2004). During an outbreak, regular changing of substrate and disinfection of enclosures is recommended to reduce the environmental spore load (Breed and Eden 2008).

Surveillance and management

Wildlife disease surveillance in Australia is coordinated by the Wildlife Health Australia. The National Wildlife Health Information System (eWHIS) captures information from a variety of sources including Australian

government agencies, zoo and wildlife parks, wildlife carers, universities and members of the public. Coordinators in each of Australia's States and Territories report monthly on significant wildlife cases identified in their jurisdictions. NOTE: access to information contained within the National Wildlife Health Information System dataset is by application. Please contact admin@wildlifehealthaustralia.com.au.

There is no targeted surveillance program for *C. piliforme* but being an "Interesting or Unusual disease", any cases detected during general surveillance should be captured by the national surveillance system.

Statistics

Limited information on Tyzzer's disease is available in the National Wildlife Health Surveillance Database. Case listed in eWHIS include the outbreak juvenile common ringtail possums in care in Victoria (eWHIS 1585) and an outbreak in captive spinifex hopping mice (eWHIS 4569).

Research

None listed.

Human health implications

While not considered to be an important human disease, antibodies have been found in people and one clinical case has been recorded in a man infected with HIV-1 (Wobeser 2001).

Conclusions

Though well recognised in captive Australian marsupials and rodents, Tyzzer's disease appears to be an uncommon cause of mortality in wild animals in Australia.

References and other information

Breed, A, Eden, P (2008) Rodents. In 'Medicine of Australian mammals.' (Eds L Vogelnest, R Woods.) pp. 503-526. (CSIRO: Melbourne).

Canfield PJ and Hartley WJ. Tyzzer's disease (*Bacillus piliformis*) in Australian marsupials. *Journal of Comparative Pathology* 1991; 105:167-173.

Hum, S, Best, F (1988) Tyzzer's disease in a wombat. *Australian Veterinary Journal* 65, 89-91.

Jenkins JR. Gastrointestinal diseases. In: Quesenberry KE and Carpenter JW, editors. *Ferrets, Rabbits and Rodents: Clinical Medicine and Surgery, 2nd edition*. Saunders, St. Louis, 2004:161-171.

Ladds, P (2009) Bacterial diseases in terrestrial mammals. In 'Pathology of Australian Native Wildlife.' (Ed. P Ladds.) pp. 65-104. (CSIRO publishing: Collingwood).

Rakich PM and Latimer KS. Tyzzer's disease in a young brown-throated conure (*Aratinga pertinax*). *Proceedings of International Virtual Conferences in Veterinary Medicine: Diseases of Psittacine Birds* 1998; <http://www.vet.uga.edu/vpp/ivcvm/1998/rakich/index.php>.

Raymond JT, Topham K, Shiota K, Ikeda T, and Garner MM. Tyzzer's disease in a neonatal rainbow lorikeet (*Trichoglossus haematodus*). *Veterinary Pathology* 2001; 38:326-327.

Rose, K (2005) Common Diseases of Urban Wildlife - Mammals. (Ed. ARWH.) (ARWH: Sydney). Available at http://arwh.org/sites/default/files/files-uploads/Common%20Diseases%20of%20mammals_no_images.pdf [Accessed 16 Jan 2017].

Saunders GK, Sponenberg DP, and Marx KL. Tyzzer's disease in a neonatal cockatiel. *Avian Diseases* 1993; 37:891-894.

Speare R, Haffenden AT, Daniels PW, Thomas AD and Seawright CD. Diseases of the Herbert River ringtail, *Pseudocheirus herbertensis*, and other North Queensland rainforest possums. In: Smith AP and Hume ID, editors. *Possums and Gliders*. Australian Mammal Society, Sydney, 1984:283-302.

Watts CHS. Australian hydromyine rodents: maintenance of captive colonies. In: Evans DD, editor. *The Management of Australian Mammals in Captivity*. The Zoological Board of Victoria, Melbourne, 1982:180-184.

Wobeser G. Tyzzer's disease. In: Williams ES and Barker IK, editors. *Infectious Diseases of Wild Mammals*, 3rd edition. Iowa State University Press, Ames, 2001:510-513.

Acknowledgements

The following people have had input into this document: Peter Holz and R. Woods.

Updated: Jan 2017

To provide feedback on this fact sheet

We are interested in hearing from anyone with information on this condition in Australia, including laboratory reports, historical datasets or survey results that could be added to the National Wildlife Health Information System. If you can help, please contact us at admin@wildlifehealthaustralia.com.au.

Wildlife Health Australia would be very grateful for any feedback on this fact sheet. Please provide detailed comments or suggestions to admin@wildlifehealthaustralia.com.au. We would also like to hear from you if you have a particular area of expertise and would like to produce a fact sheet (or sheets) for the network (or update current sheets). A small amount of funding is available to facilitate this.

Disclaimer

This fact sheet is managed by Wildlife Health Australia for information purposes only. Information contained in it is drawn from a variety of sources external to Wildlife Health Australia. Although reasonable care was taken in its preparation, Wildlife Health Australia does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information or its usefulness in achieving any purpose. It should not be relied on in place of professional veterinary consultation. To the fullest extent permitted by law, Wildlife Health Australia will not be liable for any loss, damage, cost or expense incurred in or arising by reason of any person relying on information in this fact sheet. Persons should accordingly make and rely on their own assessments and enquiries to verify the accuracy of the information provided.



Find out more at www.wildlifehealthaustralia.com.au
email admin@wildlifehealthaustralia.com.au
or call +61 2 9960 6333